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# A taxonomic review of *Brachyscome* Cass. s.lat. (Asteraceae: Astereae), including descriptions of a new genus, *Roebuckia*, new species and new infraspecific taxa

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## Abstract

A brief outline of the problems with the delimitation of the genus, keys to all Australian species and species groups, descriptions of most recognised species, and notes concerning nomenclatural matters of many names are provided. Of the 87 species here recognised as constituting *Brachyscome* s.lat. in Australia, 17 are new, as are four subspecies: *B. abercrombiensis* P.S.Short, *B. barkerae* P.S.Short, *B. billabongensis* P.S.Short, *B. casstiana* P.S.Short, *B. dalbyensis* P.S.Short, *B. foliosa* P.S.Short, *B. georginensis* P.S.Short, *B. gilesii* P.S.Short, *B. gracilis* subsp. *robusta* P.S.Short, *B. melanocarpa* subsp. *thompsonensis* P.S.Short, *B. microcarpa* subsp. *darlingensis* P.S.Short, *B. paludicola* P.S.Short, *B. rudallensis* P.S.Short, *B. simulans* P.S.Short, *B. staceae* P.S.Short, *B. tamworthensis* P.S.Short, *B. tasmanica* P.S.Short, *B. trisecta* P.S.Short, *B. walshii* P.S.Short, *B. watanabei* P.S.Short and *B. whitei* subsp. *lophoptera* P.S.Short. A new genus, *Roebuckia* P.S.Short, is also described. It contains nine species, five of which are newly described along with some new varieties: *R. cheilocarpa* (F.Muell.) P.S.Short, *R. cheilocarpa* var. *glabrata* P.S.Short, *R. cheilocarpa* var. *integra* P.S.Short, *R. cheilocarpa* var. *quobbensis* P.S.Short, *R. chinnockii* P.S.Short, *R. ciliocarpa* (W.Fitzg.) P.S.Short, *R. cuneata* P.S.Short, *R. halophila* (P.S.Short) P.S.Short, *R. lathamensis* P.S.Short, *R. lathamensis* var. *glabrata* P.S.Short, *R. lathamensis* var. *glandulosa* P.S.Short, *R. nerrenensis* P.S.Short, *R. oncocarpa* (Diels) P.S.Short and *R. similis* P.S.Short.

Lectotypifications are made for the following names: *Brachyscome glabra* Benth., *B. debilis* Sond., *B. sieberi* var. *gummii* DC., *B. radicata* Hook.f., *Silphiosperma* Steetz and *Steiroglossa* DC. New lectotypes are chosen for the names *Brachyscome angustifolia* A.Cunn. ex DC., *B. exilis* var. *scabrida* Sond. and *Paquerina graminea* var. *heterophylla* Sond.

Notes concerning the previously segregated genera *Allittia* P.S.Short, *Hullsia* P.S.Short and *Pembertonia* P.S.Short are incorporated in this review.

Pollen:ovule ratios are reported for most species and a comparative table of character states for all species is presented.

**Keywords:** Asteraceae, Astereae, *Brachyscome*, *Roebuckia*, review, nomenclature, taxonomy, pollen:ovule ratios, Australia.

## Introduction

I had your *Brachycomes* all this time ... I took them home and examined them this morning, but with little results. It seems to me the most perplexing genus of the whole Flora, and none of the keys published is satisfactory; all the characters run into each other, neither the wings of the achenes nor the radical or stem leaves are constant. I wish Baron v. Mueller would publish a monography of the genus, but, I believe, even he, with his great experience and enormous herbarium & material would find great difficulties in settling the boundaries of the species. The whole genus seems to be in an unsettled state, that is, in a state of very active variation.

*E. Betche to J.H. Maiden, 8 April 1894,  
extract from letter attached to NSW 228424*

Apart from the spelling of the name (which is now generally accepted as being *Brachyscome*; e.g. Brummitt 1993; Flann et al. 2010), Ernst Betche largely summed up the taxonomic difficulty of this genus, then and now.

When initially conceived, the project was envisaged as a major revision of *Brachyscome* s.lat., one which would include detailed cladistic analyses of morphological and anatomical data and molecular sequences to resolve the long-standing problems of generic circumscription, which I believe exist (e.g. Short 1999, 2009), and also go some way in resolving problematic species complexes. At the time I did not foresee changes in my work environment or appreciate the enormity of the project. Thus, there are still numerous taxonomic problems; there are still species, both described and undescribed, which are difficult to delimit, and the problem of generic circumscription remains.

Now, somewhat belatedly, I am bringing my work on *Brachyscome* to a halt. In these notes I summarize some of the information that has been acquired by others and add to it many of my own observations. This includes



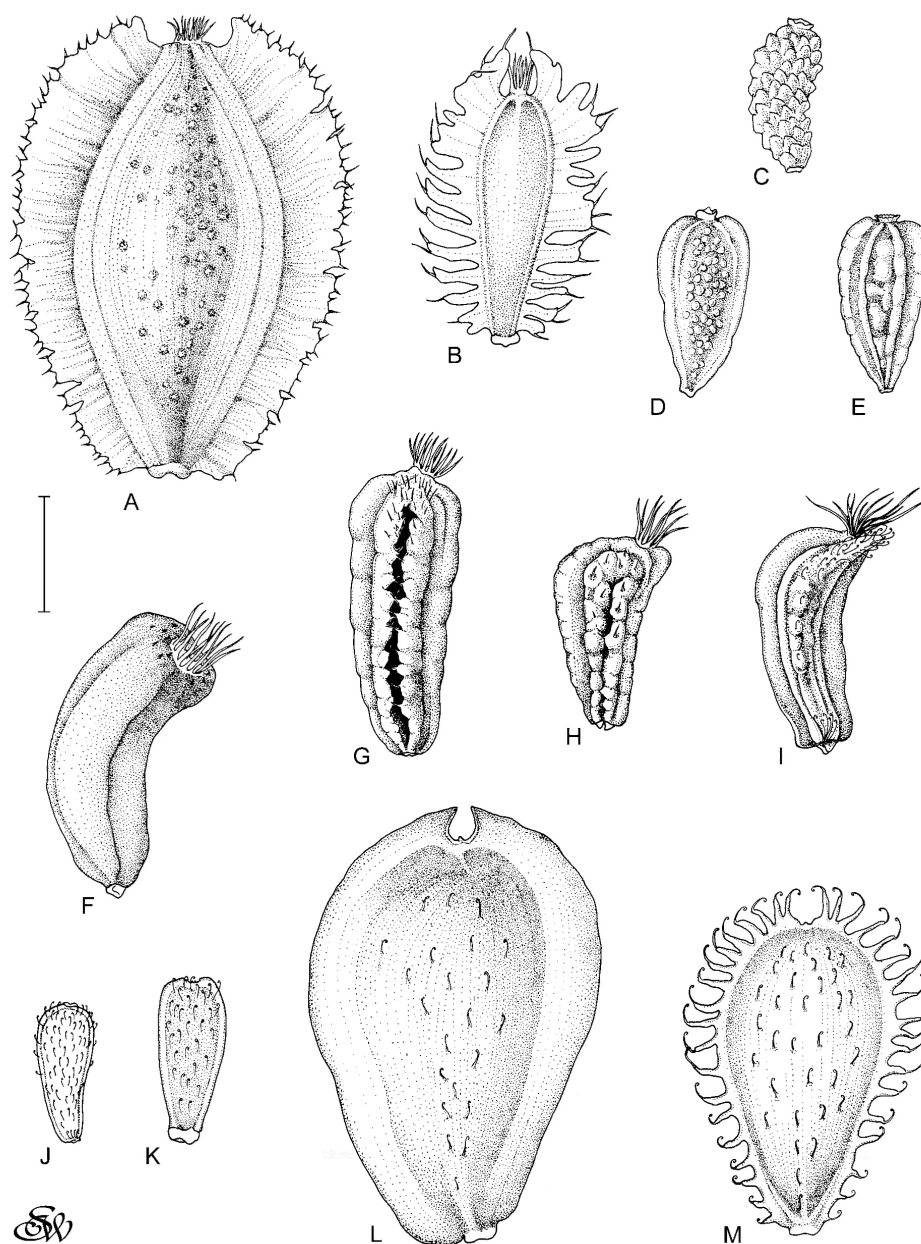


Fig. 1. *Brachyscome* cypselas. A–B *Brachyscome aculeata* group: A *B. aculeata*, lateral view (P.S. Short 3996, MEL). B *B. riparia*, lateral view (L. Hodge, MEL 545069). C–E *Brachyscome basaltica* group: C *B. basaltica*, lateral view (A. Rodd 3219, MEL). D *B. paludicola*, lateral view (holotype, H.I. Aston 2336, MEL). E *B. rara*, lateral view (isotype of *B. coongiensis*, J. Reid 1183, BRI). F–I *Brachystephium* group: F *B. cassiana*, ray cypsel, lateral view (holotype, C.W.E. Moore 8859, CANB). G *B. diversifolia*, lateral view (J.S. Whinray 705, MEL). H *B. goniocarpa*, lateral view (P.S. Short 3322, MEL). I *B. gracilis*, lateral view (N.H. Scarlett 83-317, MEL). J–M *Brachyscome ciliaris* group: J *B. dalbyensis*, lateral view (R. Jones 120, BRI). K *B. parvula*, lateral view (A.C. Beauglehole 24819, MEL). L *B. glandulosa*, lateral view (K. Watanabe 165, MEL). M *B. perpusilla*, lateral view (P.S. Short 3903, MEL). Scale bar: 1 mm. — Illustrated by S. Wickison.

the description of a new genus *Roebuckia* (within which five new species are described) and 17 new species referred to *Brachyscome* s.lat. I also deal with various nomenclatural matters, including some new lectotypifications.

I had planned to provide thorough descriptions and synonymy of all species which are, or have been, included in *Brachyscome* s.lat. Indeed, I have provided descriptions for most Australian taxa, although lack of time has meant that for several species descriptions are lacking or skeletal. In the case of the *B. ciliaris* complex it was a deliberate choice to forego a description; on current knowledge it would incorporate many taxa and be of little use. For this complex I opted to add copious notes on morphological variation and address the problem of the application of the names currently reduced to synonymy under the name *B. ciliaris*. Apart from a summation of the variation encountered in *B. radicata* Hook.f. s.lat., I have not provided descriptions for any species from New Guinea and New Zealand, all of which are referred below to the *Paquerina* group. However, data recorded for these taxa are incorporated in Appendix 2 and notes on the anatomy of cypselas are reported for several of these taxa.

Consideration was given to recognising some segregate genera in addition to the previously described genera *Allittia* P.S.Short, *Hullsia* P.S.Short and *Pembertonia* P.S.Short; these included the *B. dentata* group and the *B. iberidifolia* group along with reinstatement of the generic names *Brachystephium* Less., *Steiroglossa* DC. and *Paquerina* Cass. I have no doubt that the last name, as applied here to the *Paquerina* group, represents a non-monophyletic grouping, but I believe the others are generally well-delimited and likely to be monophyletic. However, species relationships need to be more thoroughly explored before any major changes in generic circumscription. Accordingly, I have only established one new genus, *Roebuckia*, for a group of species which is mostly restricted to Western Australia, and refer other new taxa described here to *Brachyscome*.

### History

*Brachyscome* was described by Cassini (1816) with just a single species recognised. Various authors, e.g. Candolle (1836), Bentham (1837) Sonder (1853), added additional species to the genus and in Australia, Bentham (1867) recognised 36 species in his *Flora Australiensis*, and noted three as occurring in New Zealand. He included four genera, *Brachystephium* Less., *Paquerina* Cass., *Silphiospermum* Steetz and *Steiroglossa* DC. in synonymy. There the matter rested more or less unchanged, until revisionary work by Davis (1948, 1949a, 1949b, 1955, 1959) resulted in the recognition of 65 species of *Brachyscome*, with 62 in Australia and three in New Zealand and for many years this treatment was followed by Australian taxonomists (e.g. Willis 1973). However, in 1968 Smith-White (1968) reported

chromosome number determinations of  $n = 2, 6$  and  $8$  for a species he referred to as *Brachyscome lineariloba* and in subsequent years he and his associates published two major papers concerning chromosome numbers in *Brachyscome* s.lat. (Smith-White et al. 1970; Carter (1978a). The paper by Smith-White et al. (1970) in particular highlighted serious shortcomings with Davis' work. Among other things, they made reference to 14 undescribed species and noted the artificiality of at least some of the species and species groups ("superspecies") she had recognised. This is not particularly surprising as Davis's review of the genus was essentially one based on herbarium specimens, many taxa were poorly represented, and many specimens were of poor quality. Despite these impediments she still achieved much. However, her work was also partly marred, because of her strict application of rules in regard to the recognition of species and infraspecific taxa. Thus, she recorded:

As a working hypothesis, variation in the fruits has been considered a specific character, and has been found to be discontinuous, the discontinuities representing gaps between species. Constant vegetative variation, on the other hand, has been given varietal status, the fruits of all varieties of any species being identical.

Davis (1948), p. 144

As well as having preconceived notions as to what character differences reflected whether a taxon should be recognised as a distinct species or as a variety, Davis (1948) also adopted the concept of "superspecies". Quoting zoologist Ernst Mayr, she noted that a superspecies "consists of a monophyletic group of geographically representative (allopatric) species which are morphologically too distinct to be included in one species" (Mayr, cited by Davis 1948, p. 145). At no stage did she discuss the possibility of recognising the various "superspecies" as sections or subgenera or consider that they may even be generically distinct. However, she did note the absence or presence of a terminal anther appendage to be a character "of considerable taxonomic importance" (Davis 1948, p. 146) and used it to distinguish two subgenera, each containing a number of superspecies. Neither of the subgeneric names employed by Davis, i.e. *Eubrachyscome* and *Metabrachyscome* are validly published, but have been employed in some cytological papers, as too have the names of her superspecies. As, under the *International Code of Nomenclature for algae, fungi and plants (ICN)*, the subgeneric names are invalid and "superspecies" are an unrecognised taxon I make only occasional reference to them when citing synonyms. I have also tended to ignore them as, although there remains much to be done to elucidate species' relationships, I believe that most "superspecies" are unlikely to be monophyletic groups, and except for some earlier cytological literature have not been widely used in recent taxonomic publications. Thus, there is little to be gained by continuing to refer to Davis's classification above the level of species.

Prior to Smith-White's (1968) paper there were several earlier reports (Davis 1950a, n.v., cited by Smith-

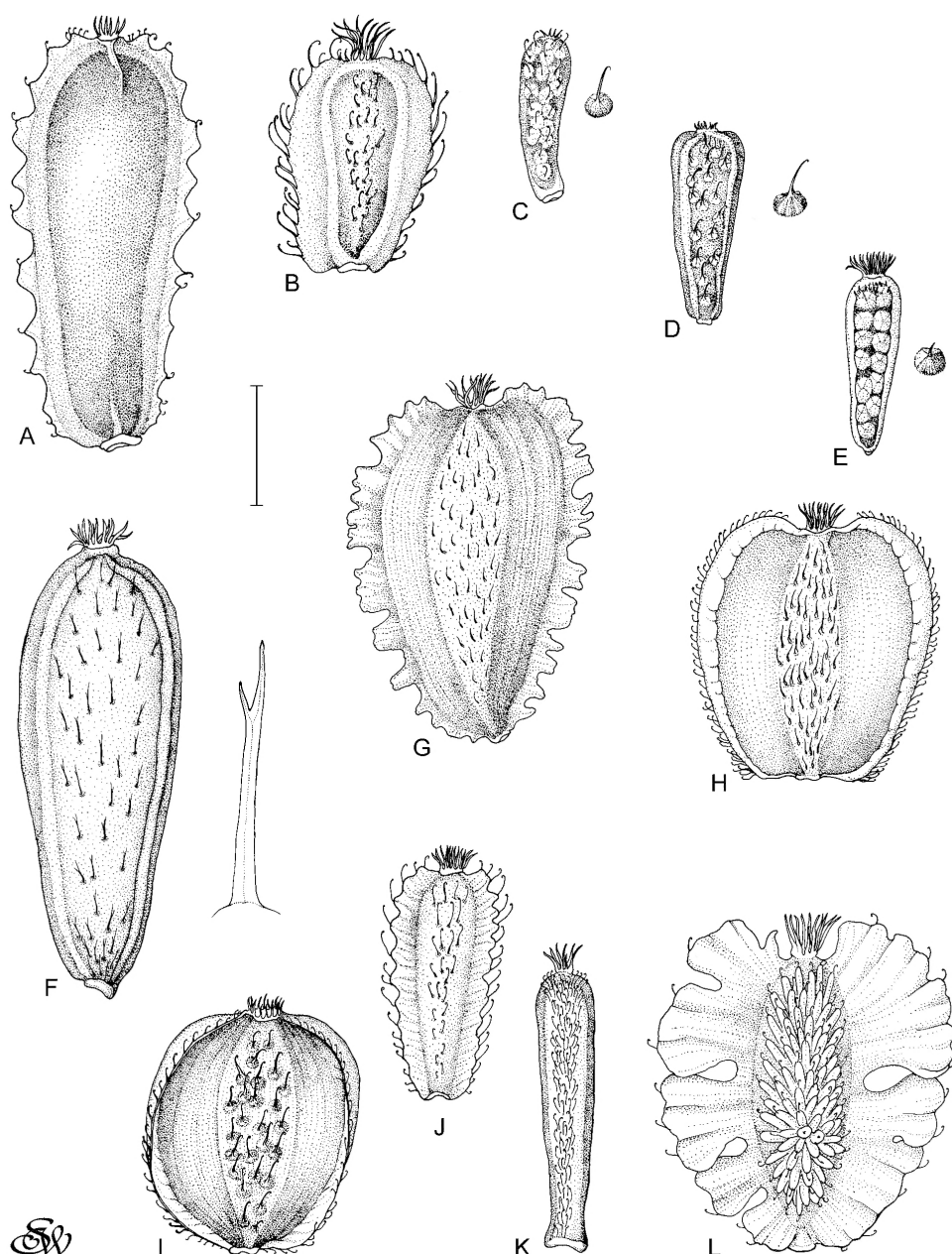


Fig. 2. *Brachyscome* cypselas. A–E *Brachyscome ciliaris* group, cont.: A *B. rigidula* s.lat., probably *B. multicaulis* s.str., lateral view (P.S. Short 3086, MEL). B–C *B. rudallensis*, lateral views (holotype, A.S. George 10648, PERTH). B winged disc cypsel. C unwinged ray cypsel, with enlargement of eglandular hair. D *B. trachycarpa*, lateral view, with enlargement of eglandular hair (P.S. Short 3781, MEL). E *B. xanthocarpa*, lateral view, with enlargement of hair (S. Smith-White 8869–8876, SYD). F *Brachyscome decipiens* group. F *B. decipiens*, lateral view, with enlargement of eglandular bifid hair (D.E. Albrecht 254, MEL). G–L *Brachyscome dentata* group. G–H *B. chrysoglossa*, lateral views. G Victorian specimen (G. Hill, MEL 552605). H Queensland specimen (P.S. Short 3052, MEL). I *B. curvicarpa*, lateral view (P.S. Short 3633, MEL). J–K *B. debilis*, lateral views. J, winged cypsel. K unwinged cypsel. L *B. dentata*, lateral view (P.S. Short 3650, MEL). Scale bar: 1 mm. — Illustrated by S. Wickison.

White et al. 1970; Turner 1970; De Jong 1963; Solbrig et al. 1964) of chromosome number determinations in *Brachyscome* s.lat., but serious studies of the cytology of *Brachyscome* can be said to have commenced with that paper. As well as the papers mentioned above there have also been many concerned with the cytology of the *B. lineariloba* complex, references to which are given in my taxonomic account of the group elsewhere in this paper. There have also been two other major reports on chromosome numbers within *Brachyscome* s.lat. (Watanabe & Short 1992; Watanabe et al. 1996), these accompanied by occasional references to taxonomic problems within the genus.

As well as the afore-mentioned cytological papers there have been some taxonomic treatments since Davis's publications, with most simply describing new species, relegating them to synonymy, or reinstating them. In Australia, Cooke (1985) described a new species, *B. xanthocarpa* and relegated *B. dimorphocarpa* G.L.R.Davis to synonymy under *B. ciliaris* (Labill.) Less., while *B. formosa* P.S.Short and *B. halophila* P.S.Short (Short 1988), *B. nodosa* P.S.Short & K.Watan. and *B. smithwhitei* P.S.Short & K.Watan. (Short & Watanabe 1993), and five new species referred to the erroneously named *B. linearifolia* group (Short 2009) have also been described. In New Zealand, Webb (1987) reinstated the names *B. humilis* G.Simpson & J.S.Thomson and *B. longiscapa* G.Simpson & J.S.Thomson. As well as these accounts several flora treatments have been produced: Lander (1987, for the Perth region), Webb (1988, for New Zealand), Everett (1992, for New South Wales), Cooke (1986, for South Australia), and Short (1999, for Victoria). However, in relatively recent times, by far the most important work for those seeking names, descriptions, and horticultural notes regarding *Brachyscome* is the superbly illustrated treatment *Australian Brachyscomes* by Salkin et al. (1995).

A few species of *Brachyscome* have been described from countries other than Australia and New Zealand. Almost invariably, these do not belong to the genus, even in the broad-sense as defined by Davis (1948), and are simply listed towards the end of this article as species to be excluded. However, two species have been described from New Guinea, and they – along with all species from New Zealand – are here referred to the loosely-defined *Paquerina* group. Two further species have also been described from New Caledonia, but they were later referred to another genus, *Pytinicarpa* G.L.Nesom, by Nesom (1994, 2001). There are a number of features by which they differ from *Brachyscome* (sensu Davis 1948), not least of which is the presence of cypselas with multiple vascular ribs on their lateral surfaces, a condition absent from all other taxa at some time referred to *Brachyscome* in the Australian region.

For some time it has been suspected that *Brachyscome* is not monophyletic. For example Watanabe et al. (1996b, p. 199), in a paper on chromosome numbers in *Brachyscome* s.lat., stated that there are “unresolved

species complexes ... and generic delimitation is also a problem”.

Molecular work has been carried out (Watanabe et al. 1996a; Denda et al. 1999) to help resolve relationships. In the latter study 45 species were included in analyses of nucleotide sequences of the chloroplast gene *matK*, and as such covered approximately half of the Australian species known at the time. However, as I have recorded (Short 2004), the results of these analyses tend to be at considerable variance with those indicated by morphological and anatomical data. Indeed, I generally rejected the work and removed ditypic *Allittia* P.S.Short and monotypic *Pembertonia* P.S.Short from the genus; I also commented that further genera should be segregated. Since then, analyses using sequences of the Internal Transcribed Spacer regions (ITS1 and ITS2) within genes coding for cytoplasmic ribosomal RNA on the A chromosome of 34 members of *Brachyscome* have been carried out by Field et al. (2006). Much of the focus of that study was on members of the *B. lineariloba* complex, with ten of the 34 members studied being races or cytodesmes of *B. dichromosomatica* and *B. lineariloba*. As well as the low number of species, only 16 of those species which were sequenced were also included in the study by Denda et al. (1999) and, as with that study, there were low bootstrap values for many clades and totally unexpected alignments of some species compared with anatomical and morphological character groupings.

Brouillet et al. (2009) included the sequence data used by Field et al. (2006) in their analyses of the tribe Astereae and this resulted in little change to the topography in regard to *Brachyscome* s.lat. However, it did place *Laenmecia sopherifolia*, used as an outgroup species and a sister clade to *Brachyscome* in Field et al. (2006), in a well-removed South American clade.

Thus, the molecular work carried out to date must be treated with considerable caution; more species need to be examined and other molecular sequences are required. As a result, I only occasionally refer below to the published molecular work.

## Methodology

### Fruit sections

To obtain transverse sections of fruit, mature fruit were rehydrated in distilled water and then fixed in 5% glutaraldehyde in 0.9% Pipes buffer. Following fixation and dehydration fruit were infiltrated with L.R. White (London Resin Co.). Infiltration of L.R. White through a progression series – (L.R. White & ethanol) 25%, 50%, 75%, 100% (twice) – was carried out for approximately two weeks at each concentration. Resin was polymerised overnight by using U.V. light in a nitrogen atmosphere. Sections, approximately two microns thick, were stained with toluidine blue (pH 4.5) or Aniline blue-black.

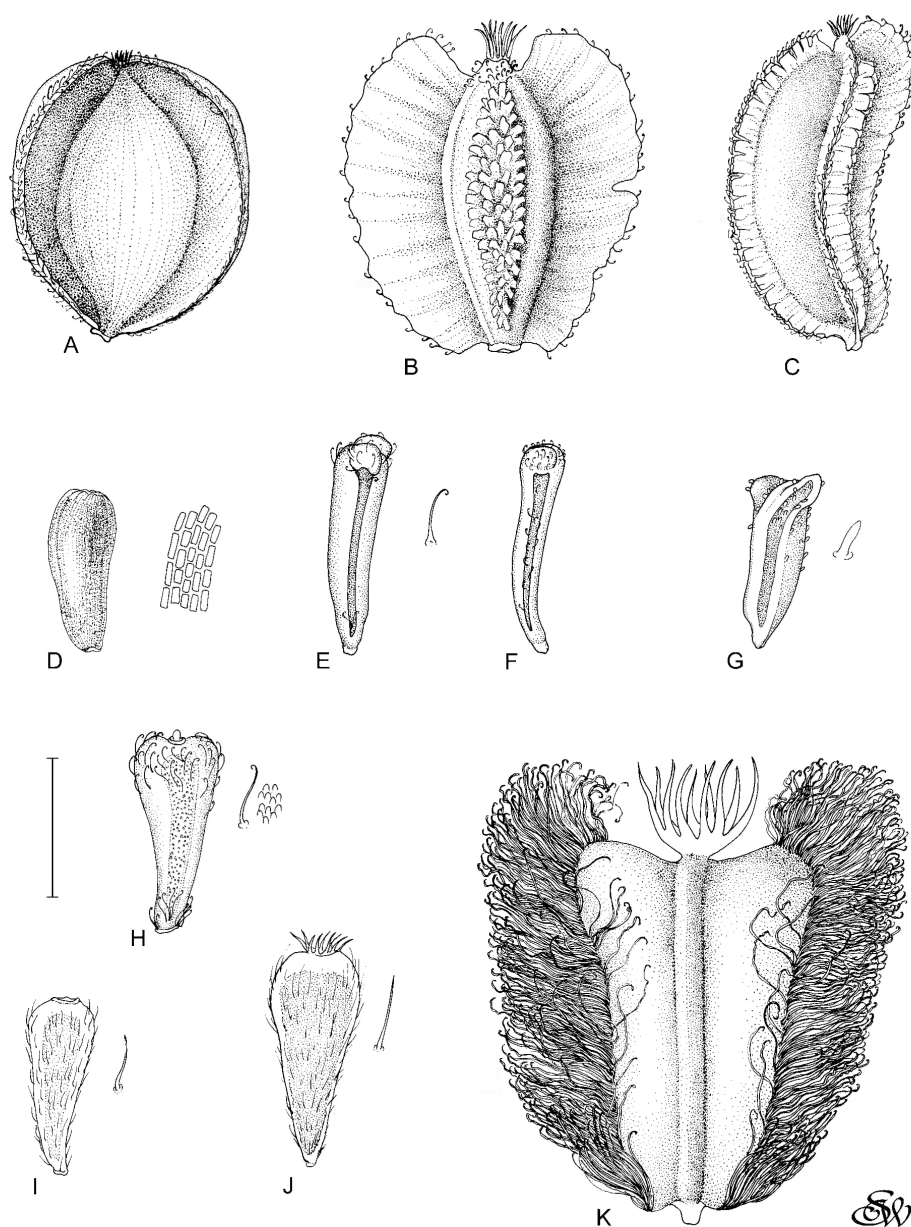


Fig. 3. *Brachyscome* cypselas. **A–C** *Brachyscome dentata* group, cont. **A** *B. georginensis*, lateral view (holotype, R.W. Purdie 1427, BRI). **B** *B. papillosa*, lateral view (C.R. Carter 6720, SYD). **C** *B. tetrapterocarpa*, radial view showing both central wings (P.S. Short 3609, MEL). **D–J** *Brachyscome iberidifolia* group. **D** *B. bellidioides*, lateral view, enlargement showing tessellated surface (B.J. Keighery & N. Gibson 29, PERTH). **E–G** *B. exilis* s.lat., lateral surfaces. **E–F** ray & disc cypselas from same capitulum (A.G. Spooner 8830, AD). **E** ray cypselas with enlargement of eglandular hair. **F** disc cypselas. **G** ray cypselas, enlargement of apically obtuse, eglandular hair (D.E. Symon 10472, AD). **H** *B. iberidifolia* s.lat., lateral view, enlargements of an eglandular hair and minutely papillate surface (L. Haegi 2552, MEL). **I** *B. gilesii*, lateral view, enlargement of eglandular hair (B.G. Thomson 2127, DNA). **J** *B. simulans*, lateral view, enlargement of eglandular hair (holotype, A.M. Ashby 3333, AD). **K** *Brachyscome lineariloba* group. *B. lineariloba*, radial view (P.S. Short 1248, MEL). Scale bar: 1 mm. — Illustrated by S. Wickson.

### Phenology and pollen:ovule ratios

Flowering times of individual species were gleaned from label data accompanying herbarium specimens.

Estimated pollen:ovule ratios were determined on a capitulum basis (e.g. as in Short & Watanabe 1993). That is, having determined the number of pollen grains in a single bisexual disc floret this figure is multiplied by the total number of bisexual florets in the capitulum and then divided by the total number (bisexual plus female) of all florets in the capitulum. Such data were usually determined from spirit collections specifically gathered for this purpose, with determinations made from 5–15 individual capitula (each from a different plant and randomly collected) from one or more populations. When no spirit material was available, determinations were made from a capitulum removed from a dried specimen. In such cases the capitulum was soaked in water and a drop of detergent for 24 hours and then transferred to 70% alcohol for several hours before dissection.

Spirit collections used in obtaining this data have not been retained. They were specifically collected for the determination of pollen:ovule ratios and the measurements of morphological features such as the size of florets and the number and shape of bracts; such work reduces capitula to little more than a mix of florets and bracts. However, all spirit collections were vouchered as dried herbarium specimens and that voucher is given when citing pollen:ovule ratios.

### Morphology and anatomy

Over many years I have accumulated much data on morphological and anatomical characters, as well as data on pollen:ovule ratios and chromosome numbers, for approximately 200 species of Australian Astereae. I used the data in unpublished cladistic analyses to investigate species and generic relationships and, given their morphological and anatomical variation, it was unsurprising, for example, that *Minuria* DC. s.lat. did not show as being monophyletic, that *Peripleura* (N.T.Burb.) G.L.Nesom was not shown to be distinct from *Vittadinia* A.Rich., while *Dichromochlamys* nested within *Ixiochlamys* – observations consistent with those of the ITS-based phylogeny of Brouillet et al. (2009). In contrast to the ITS-analyses, depending on the morphological, anatomical and cytological data used, and the species used, *Brachyscome* s.lat. did not always group as a single clade when analysed with other members of Australian Astereae. I also ran analyses of species only referred to *Brachyscome* s.lat. and it was also common to find some distinctive clades, e.g. *Roebuckia*, the *Brachystephium* group and the *B. lineariloba* group regularly grouped together, each as a distinct subclade in their own right, but grouping together by their shared possession of cypselas with swollen lateral surfaces. However, the relationships of very many species of *Brachyscome* s.lat. were simply unresolved. In running such analyses, I had the usual

problems as to definition and homology of characters and how they should be scored, wondered about the suitability of various outgroups, and was disturbed by the extent to which I could manipulate outcomes. Exploring possible relationships was fascinating, but I was left with more questions than answers and the belief that much more work is required, particularly in molecular sequencing, before the taxonomy of this group can be satisfactorily resolved. However, the data I recorded for members of *Brachyscome* s.lat. are presented here in tabular form (Appendices 1 & 2). This makes for ease of taxon comparison and the data is also available to others for use in the formation of interactive keys and their own cladistic analyses.

As noted above, with the exception of *B. radicata* s.lat., descriptions of the species from New Guinea and New Zealand are not provided in this review. However, I have included their character states in Appendix 2.

### Characters

#### Habit, duration, etc.

##### 1. Duration: (0) perennial; (1) annual.

This feature is usually easily ascertained but in some species there is conflicting information. For example, field observations suggest that *B. melanocarpa* is an annual species but cultivated specimens behave as perennials (Mrs E. Salkin, Mrs J. Barker pers. comm. 1994). This and other “difficult” species are usually scored for the feature as observed under field conditions; otherwise it was ascertained from herbarium specimens and published descriptions.

The New Zealand species, *Brachyscome linearis*, is described as an “annual rosette herb” by Webb (1988, p. 184) and as an “annual or winter-annual ... with radical rosettes of lvs from slender stock” by (Allan 1961, p. 598). The two specimens seen by me (*L.B. Moore* CHR 233898; *P.N. Johnson* CHR 216373) seem to be rhizomatous/stoloniferous, inconspicuously-flowered, perennials and Dr B. Molloy (in litt., 12 Jan. 2000) has informed me that the species was grown in a pot for several years and that he assumes it to be “a short-lived, tufted perennial”. Thus, it is here recorded as a perennial.

##### 2. Habit: (0) shrub; (1) herb.

Most perennial taxa are definitely classifiable as herbs, as they lack woody growth; just a few have woody growth and are recorded as shrubs.

##### 3. Branches corky at base: (0) absent; (1) present.

##### 4. Rosetted-herbs: (0) absent; (1) scapose; (2) scapiform.

Rosetted-herbs are non-branching plants with leaves primarily in basal rosettes and each rosette with one or more monocephalous scapes (or peduncles). In scapose plants leaves or leaf-like bracts are absent or, if present, do not obviously grade from the basal leaves. In scapiform plants the leaves or leaf-like bracts are

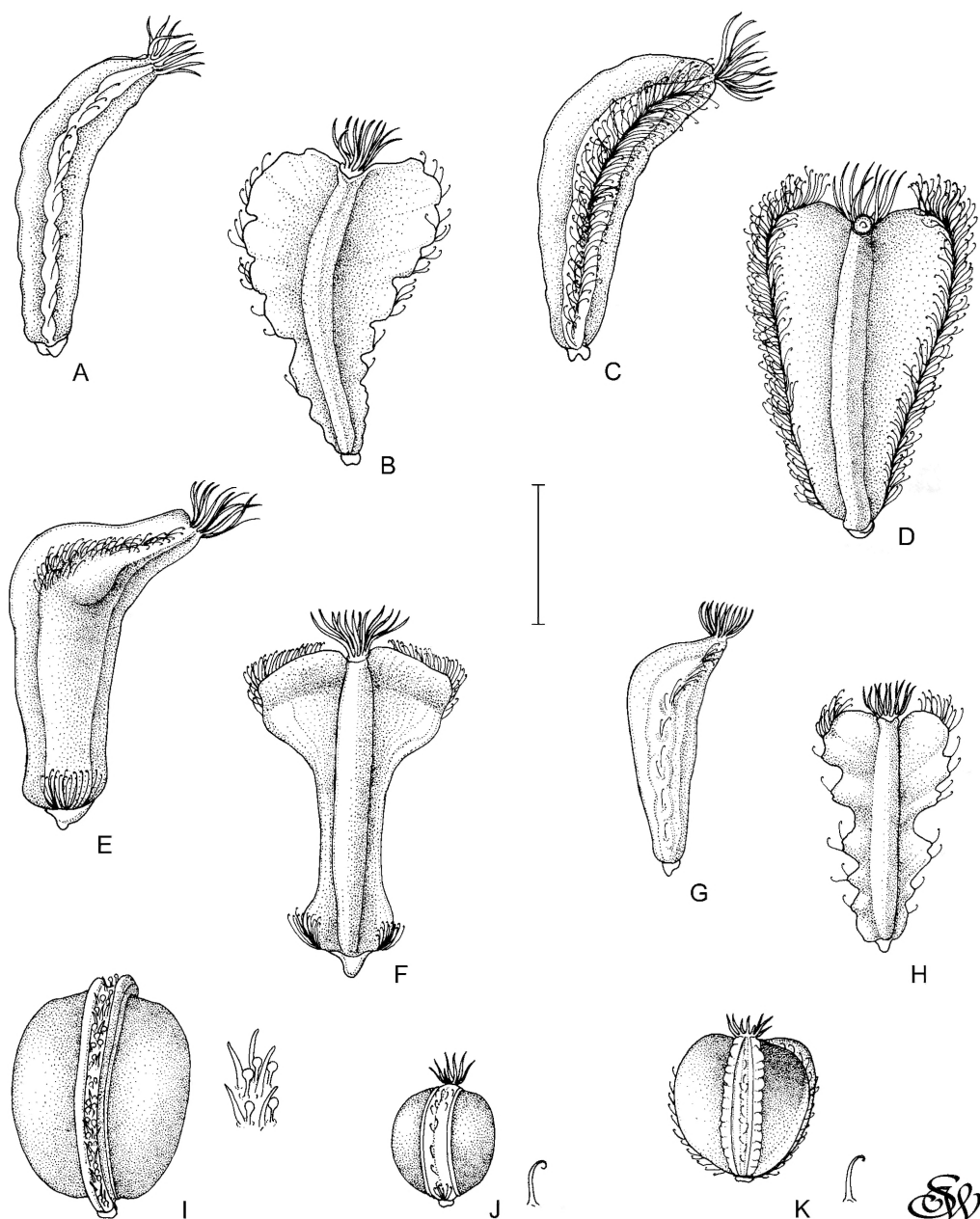


Fig. 4. *Brachyscome* cypselas. A–H *Brachyscome lineariloba* group, cont. A–B *B. campylocarpa* (R. Filson 3305, MEL). A lateral view. B radial view. C–D *B. eriogona* (K. Watanabe 690, MEL). C lateral view. D radial view. E–F *B. smithwhitei* (K. Watanabe 648, MEL). E lateral view. F radial view. G–H *B. watanabei* (holotype, C.T. White, BRI 272391). G lateral view. H radial view. I–K *Brachyscome muelleri* group, all lateral views. I *B. muelleri*, enlargements showing eglandular and stalked glandular hairs (J.D. Briggs 970, MEL). J *B. muelleroides*, enlargement of eglandular hair (P. Foreman, MEL 2031289). K *B. ptychocarpa*, enlargement of eglandular hair (P.S. Short 4151, MEL). Scale bar: 1 mm. — Illustrated by S. Wickison.



always present on the scape and leaves grade in size from the basal rosette leaves to the uppermost leaves of the scape. This can be a difficult character to score. For example, in *Allittia uliginosa* there are usually just a few leaves formed well above the basal leaves, but, as there are some specimens in which scapose leaves are close to the base and intermediate in size between those of the basal rosette and the upper scape, it is considered to be a scapiform species. The entire-leaved species *B. stolonifera* is also scored as scapiform, as, although there is frequently only a single leafy bract, it is commonly in the lower  $\frac{1}{2}$  of the scape, suggesting a gradation. On the other hand, I have simply scored *B. obovata*, *B. scapigera* and *B. tenuiscapa* as “1, 2”, indicating that they are rosetted herbs, but that they are not readily classifiable as either scapose or scapiform, while *B. radicata* may be scapiform or slightly branching and is scored as “0, 2”.

**5. Vegetatively spreading:** (0) absent; (1) present.

Some plants spread by layering, while others are rhizomatous or stoloniferous and to some extent appear to reproduce vegetatively. I have not determined through anatomical studies whether plants are strictly rhizomatous or stoloniferous, but give, in descriptions, what I believe is the case, albeit that this is sometimes difficult to tell from herbarium specimens. Sometimes both occur; plants comprising a specimen of *B. radicata* (Druce, CHR 192484) have short, thick, underground rhizomes, but a thin, aerial stolon is also present in one plant.

The *B. ciliaris* complex contains both annual and perennial taxa, with at least one perennial entity appearing to reproduce vegetatively; thus for this complex the character is scored “0, ?1”. At least some forms referred to *B. rigidula* layer (e.g. Salkin et al. 1995), and this species is scored as “?0, 1” in Appendix 2.

Allan (1961) recorded that the New Zealand species *B. linearis* produces rosettes of leaves “from slender stock”, a description suggestive of a rhizome, and it is scored as “1”.

**6. Roots stout, fleshy and bunched together:**

(0) absent; (1) present, at least sometimes.

A feature only recorded in *B. decipiens* and some members of the *B. triloba* group.

**7. Zig-zag branching pattern:** (0) absent; (1) present.

A distinctive pattern and at first glance a simple dichotomous one, but with a leaf, not another branch, formed at the branching node. It occurs quite consistently in at least four members of the *B. iberidifolia* group and is occasionally, but not consistently, noticeable (and therefore not recorded as present, but as “?” in Appendix 2) in several species of *Roebuckia*, as well as being a pattern encountered in some annual species of Australian Gnaphalieae.

## Leaves

Leaves in all species are sessile, but vary in many other features.

**8. Leaf position:** (0) alternate; (1) uppermost cauline leaves opposite.

The cauline leaves in all species are alternate, but in several entities within the *B. microcarpa* complex, i.e. *B. microcarpa* s.str., an entity with  $n = 5$ , and in subsp. *darlingensis*, the uppermost cauline leaves are opposite.

**9. Leaf bases forming fibrous remains:** (0) absent; (1) present.

This is a useful feature for distinguishing between *B. obovata* and *B. scapigera* and I have recorded their presence for a number of species of the tribe Astereae, including *Keyserria radicans* (F.Muell.) Mattf., *Lagenophora neocaledonica* S.Moore, and both species of *Allittia* and *Pytinicarpa*.

**10. First-formed leaves entire:** (0) absent; (1) present.

**11. First-formed leaves linear, entire:** (0) absent; (1) present.

This feature, be it for first-formed leaves or in older leaves, helps delineate the *B. lineariloba* group.

There are many gaps in the records for both this and the previous character (10). Those for which there are records were often gleaned from information compiled by the late Mrs Esma Salkin, but, for annual species, have also been obtained from herbarium specimens.

**12. Adult leaves entire:** (0) absent, toothed or otherwise dissected; (1) present.

In many species the first-formed, and usually some of the last-formed, leaves are entire. The character states are based on examination of all leaves and more often than not leaves are variously incised. Only in a very few species are all the leaves entire.

Specimens of *B. basaltica* and *B. muelleroides* almost invariably have entire leaves and the feature is considered to be present; only rarely do some leaves have one or two small teeth or very small, irregularly placed lobes and these are regarded as aberrations. Similarly, in *B. radicans* and *B. tadgellii*, the leaves are usually entire, but some leaves may have a few deep lobes. The frequency is such that they cannot be regarded as aberrations and all are members of the one complex, in which all but one other putative member have predominantly divided leaves. Thus, they are scored as “0”, as is *B. humilis*, which often has, or mostly has, entire leaves, but also has variously lobed leaves. This is also done with *B. linearis*, in which the leaves of the specimens that I have examined had only entire leaves, but for which Davis (1949a, p. 103) recorded that leaves are entire “or rarely with a single linear tooth” and for which Allan (1961, p. 598) recorded that the leaves are “entire or with 1–(3) minute subapical teeth”.

In species such as *B. parvula* which are scored as “0, 1” some entities have only entire leaves, others have entire and divided leaves.



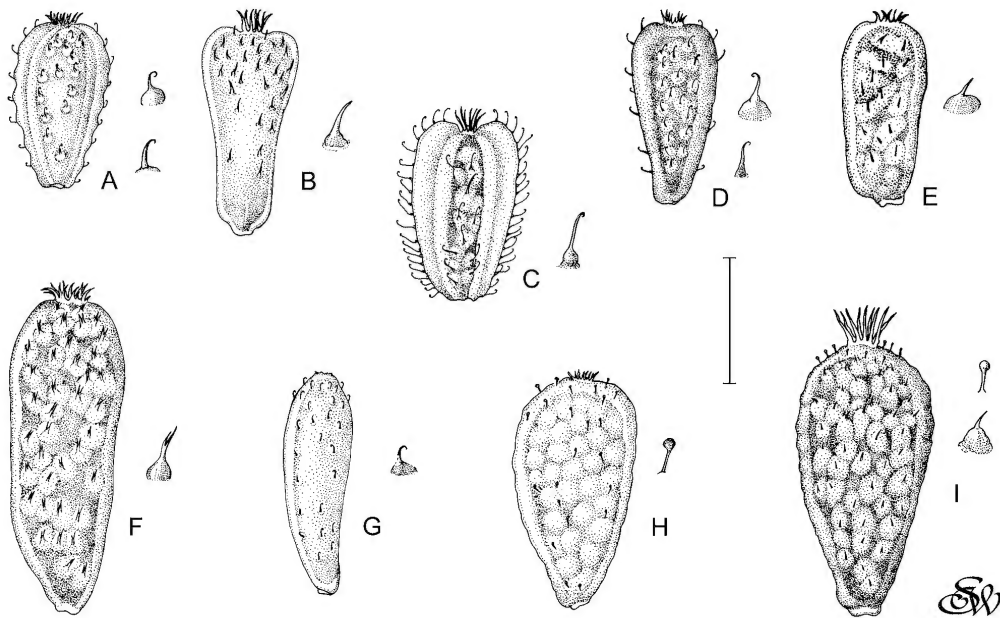


Fig. 5. *Brachyscome* cypselas. *Brachyscome multifida* group, all lateral views. **A** *B. stuartii*, with enlargements of eglandular hairs (I.R. Telford 8989, MEL). **B** *B. abercrombiensis*, with enlargement of eglandular hair (holotype, D. Mallinson 355, CBG). **C** *B. dissectifolia*, with enlargements of eglandular hair (P.S. Short 3973, MEL). **D** *B. microcarpa* subsp. *darlingensis*, with enlargements of eglandular hairs (holotype, P.I. Forster 9831, MEL). **E** *B. trisecta*, with enlargement of eglandular hair (holotype, W. Cherry 344, NSW). **F** *B. multifida*, with enlargement of forked eglandular hair (P.S. Short 4021, MEL). **G** *B. tamworthensis*, with enlargement of hair (holotype, P.S. Short 3958, MEL). **H** *B. nova-anglica*, with enlargement of stalked glandular hair (P.S. Short 3978, MEL). **I** *B. melanocarpa* subsp. *melanocarpa* with enlargements of glandular and eglandular hairs (P.S. Short 2433, MEL). Scale bar: 1 mm. — Illustrated by S. Wickison.

**13. Leaf lobes linear:** (0) absent; (1) present.

This relates to the length:width ratio. In some species fresh leaves may have subterete, linear lobes, but as the subterete nature is not always noticeable on herbarium specimens it is not recorded.

In plants in which the first-formed leaves are linear, the later leaves are also usually linear or, if dividing, also have linear lobes. However, this is not always the case, as e.g. in *B. breviscopis*.

**14. Leaves 2-pinnatifid or 2-pinnatisect:** (0) absent; (1) present (at least some present).

Specimens are usually very obviously 1- or 2-pinnatifid or pinnatisect. Occasionally there are small and often irregular and always minute secondary lobes on otherwise predominately 1-pinnatifid/pinnatisect leaves and these are scored as "??". For specimens such as those referable to *B. lyrifolia* – treated here as a member of the *B. ciliaris* complex – only some leaves on a plant are 2-pinnatifid/pinnatisect and in smaller plants they may be absent. As some are invariably present on large specimens the species is considered to have such leaves.

**15. Leaves apically 3-lobed:** (0) absent (entire or otherwise lobed); (1) present.

This incorporates species in which the leaves are

commonly linear-obtriangular in outline and are apically 3-lobed, but otherwise have entire margins. Note that leaves with additional lobes and/or entire leaves may also be found on the same plant, e.g. *B. chrysoglossa*. It is a feature of *B. triloba* and many members of its species group, and one that supports the placement of *B. debilis* in the *B. dentata* group.

**16. Leaves with rounded lobes along their length:** (0) absent (entire or lobes not occurring throughout the length of the leaf); (1) present.

This applies to two New Zealand species, *B. pinnata* and *B. sinclairii*, although in the latter, not all leaves are lobed throughout their length. Such leaves were illustrated in Davis (1949a, Fig. 21–24).

**17. Leaf lamina dilated in the lower 1/3 to 1/2:** (0) absent (not dilated or dilated for less than 1/3 their length); (1) present.

Some dilation of the leaf base is not unusual in many species of *Brachyscome* s.lat., but consistent dilation in the lower 1/3 to 1/2 of the cauline leaves is a feature shared only by members of the *Brachystephium* group.

**18. Leaf apex dilated:** (0) absent; (1) present.

A feature generally present in taxa placed in the *B. lineariloba* group.

**19. Leaves glaucous:** (0) absent; (1) present.

All specimens of *Hullsia argillicola* have consistently glaucous leaves. Only some specimens of *B. basaltica* s.str. have glaucous leaves; it is recorded as “0, 1”.

**20. Leaves 3-veined:** (0) absent; (1) present.

*Hullsia argillicola* has a prominent midvein and on either side of it there is a prominent lateral vein extending from the base. Large leaves of *Brachyscome basaltica* also have 3 main veins and Nesom (1994) recorded them for *Pytinicarpa*. However, I only consider them to be consistently well-formed in *Hullsia*.

**21. Leaves overtopping capitula:** (0) absent; (1) present.

Only regularly noted in *B. breviscapis* and sometimes tending this way in a few plants of *B. goniocarpa*. In both cases the species are ephemerals with low pollen:ovule ratios and are presumably not dependent on cross-pollination and, therefore, do not require well-displayed capitula.

**Hairs on leaves, bracts and major axes**

There is considerable variation in hair structure within the Astereae and documentation of the various structures and their ontogeny would in itself amount to a very large project. Only distinctive hairs are noted here.

**22. Eglanular hairs coarse, cottony:** (0) absent; (1) present.

These are the coarse hairs typically found at the base of the leaves in *Allittia*, with similar if not identical hairs in *Pytinicarpa*.

**23. Eglanular hairs with conical bases and apical flagellum:** (0) absent; (1) present.

This applies to many specimens of *B. radicata* s.lat.

**24. Eglanular hairs with a bifid apex:** (0) absent; (1) present.

*Brachyscome xanthocarpa* only.

**Capitula**

All members of *Brachyscome* s.lat. have solitary capitula and receptacles lacking receptacular scales (paleas).

**25. Mature capitula forming a solid head of fruit:** (0) absent; (1) present.

In many species belonging to *Roebuckia*, the *Brachystephium* group and the *B. lineariloba* group the mature fruit are closely packed together and form an almost solid head of interlocking fruit.

**Involucral bracts**

Vascular strands in the central part of the bracts in both *Brachyscome* s.lat. and other Australasian Astereae may or may not be well-developed and any associated thickening along the veins may be patchy to well-developed. Having examined involucral bracts of more than 150 species of Astereae, I decided that to categorise

such features was too subjective and have not recorded my observations here.

**26. Rows of bracts:** (0) Bracts in several rows, the outer bracts shorter than the inner; (1) bracts in one or almost two rows, but of approximately equal length or the inner bracts slightly smaller.

Depending on the specimens, in *B. decipiens* the differentiation into several rows of bracts of unequal length is not always pronounced, but, none the less, it is better classed as “0” than “1”. In *Allittia* there may be only several outer bracts that are manifestly shorter than the inner.

**27. Bract margins prominently and consistently dark purple:** (0) absent; (1) present.

This is a rather subjective feature and purple or purplish-tinted scarious bract margins are encountered in many species. However, only in two taxa from New Zealand, *B. humilis* and *B. linearis*, are they prominent and consistently produced.

**28. Bract epidermal cells large, thick-walled:** (0) absent; (1) present.

Sample size was small, but some alpine species appear to consistently have thick-walled, epidermal cells; in those species which have them the bracts tend to have a poorly-developed vascular system.

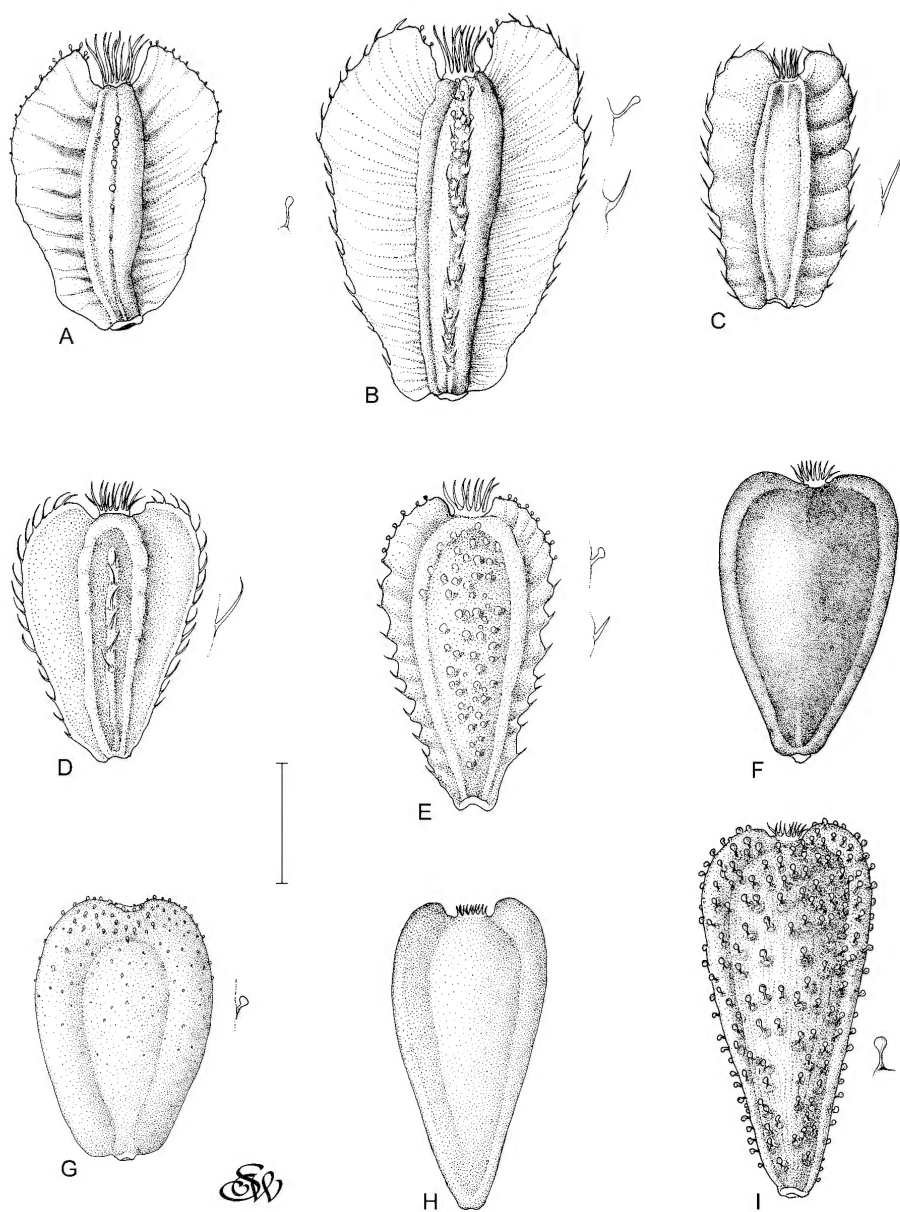
**Florets****29. Ratio of ray:disc florets:** (0) rays fewer; (1) rays more; (2) variable.

The majority of species of *Brachyscome* s.lat. have fewer ray florets than disc florets in a capitulum. This contrasts with many other Australian members of the Astereae, where the number of rays almost invariably exceeds the number of disc florets, as they do in all or many of the species referred to *Chondropyxis* D. Cooke, *Elachanthus* F.Muell., *Erigeron* L. s.lat. (as to Australian spp., including those which have been placed in *Iotasperma* Nesom), *Isoetopsis* Turcz., *Ixioclhamys* F.Muell. & Sond. ex Sond., *Lagenifera* Cass., *Solenogyne* Cass. and *Vittadinia* A.Rich. s.lat.

**30. Ray corolla colour:** (0) white, blue, pink; (1) yellow.

The majority of species have white or various shades of blue or, less commonly, pink or magenta ray corollas. Yellow rays are uncommon and following, for example, Bremer (1994), I recognise it as a distinct colour class.

In many collections of *B. dentata* the flower colour is recorded as being white but they are yellow in bud, e.g. Davis (1948, p. 189) noted that “when first expanded the rays are frequently sulphur-yellow, becoming white after a maximum of two days”. Therefore, *B. dentata* is scored as having yellow rays (1). *Brachyscome papuana* is generally described as having white, mauve or pink rays, but was recorded on the label for Stevens & Smith (LAE 54892) to have yellow rays when very young. Accordingly it too is scored as (1) for this character, as is *B. debilis*, in which ray corollas are white or mostly



**Fig. 6.** *Brachyscome* cypselas. **A–E** *Brachyscome nivalis* group, all lateral views. **A** *B. barkerae*, enlargement of stalked glandular hair (holotype, A.C. Beaglehole 40875, MEL). **B** *B. nivalis*, enlargements of stalked glandular hair and eglandular hair (B.G. Dangerfield 5, MEL). **C–D** *B. radicans*, lateral views, enlargements of eglandular hairs. **C** New South Wales specimen lacking tubercles (P.S. Short 3976, MEL). **D** Tasmanian specimen with tubercles (P.C. Jobson 1908, MEL). **E** *B. walshii*, lateral view, enlargements of stalked glandular hair and eglandular hair (holotype, N.G. Walsh 2533, MEL). **F–I** *Paquerina* group, all lateral views. **F** *B. foliosa* (holotype, M. Gray & C. Totterdell 6632, CANB). **G** *B. graminea*, enlargement of glandular hair (P.S. Short 4015, MEL). **H** *B. obovata* (P.S. Short 1122, MEL). **I** *B. radicata*, enlargement of glandular hair (L. Rodway, MEL 692709). Scale bar: 1 mm. — Illustrated by S. Wickison.

white, but yellow at the base of the ray. In *B. papillosa* the fresh ray corolla are white but dry yellow, suggesting that it could also be scored as yellow rather than “?” as in Appendix 2.

### Disc florets

A number of species (e.g. members of the *B. iberidifolia* group and *B. elegans*) have specimens with greenish lobes instead of the normal yellow. However, the extent to which the colour is consistent and whether it may be due to substrate has not been ascertained.

### 31. Sexuality: (0) bisexual; (1) male.

Male florets are found in two genera, *Hullsia* and *Pytinicarpa*, which have been segregated from *Brachyscome* on this and other characteristics.

### 32. Disc corolla lobe number: (0) 5, or mainly so; (1) 4, or mainly so.

In *B. breviscapis*, both 4- and 5-lobed corolla are common and this species is coded as (0, 1). *Brachyscome lineariloba* s.lat. is variable, but 5-lobed corollas appear to predominate.

In Asteraceae this feature is commonly correlated with low pollen:ovule ratios (e.g. Short 1981). This is the case for species of *Brachyscome* with consistently 4-lobed corollas and also for *B. breviscapis* with its 4- and 5-lobed corollas.

### Style

### 33. Terminal appendage of styles of bisexual florets: (0) shallowly deltate; (1) deltate; (2) widely deltate; (3) triangular; (4) narrowly triangular or somewhat lanceolate; (5) oblong or lanceolate-oblong.

The style appendage is the terminal part of a style arm immediately above the stigmatic portion. The shape cited is the outline as presented when a style is mounted on a microscope slide and the inner surface viewed. It is therefore recorded as a 2-dimensional, not 3-dimensional, shape.

Of all the shapes it is the oblong appendages with obtuse apices which appear to be most distinct and are characteristic of *Pembertonia latisquamea*, most species of *Roebuckia*, and several species included in the *B. iberidifolia* group.

Although not recorded for individual species in Appendix 2 it is also evident that the ratio of appendage length to the length of the stigmatic part of the style arm will likely prove a useful feature for distinguishing taxa. Considerable variation in this feature occurs among the various entities here included in the *B. microcarpa* complex, with appendages being shorter to c. 3 times the length of the stigmatic part.

### Anthers

The anther connective, consisting of thickened cells, may or may not terminate in an appendage of not or barely thickened cells. The shape of the appendage may vary but, as with most shapes, the distinction between

them is not often clear cut and thus it is not recorded here as a separate character.

Davis (1948) placed great emphasis on the presence or absence of a terminal appendage, using it to divide *Brachyscome* into two, nomenclaturally invalid, subgenera. In the *B. ciliaris* group loss of an appendage is generally correlated with apomixis and pollen sterility or, if with fertile pollen, then with low pollen:ovule ratios. In *Roebuckia* and other members lacking an appendage there is no record of apomixis and pollen:ovule ratios are high.

### 34. Anther terminal appendages: (0) present; (1) absent.

An appendage is considered to be present when the anther connective dilates and flattens. This is usually obvious, but in, for example, apomictic members of the *B. ciliaris* complex, it is sometimes difficult to decide whether an appendage is present.

### Cypsels

The single-seeded fruit or cypselas – often referred to as achenes – in *Brachyscome* s.lat. are commonly laterally compressed and, when loose fruit are allowed to lie as they fall, then it is the lateral surface which is observed. With the exception of several species (e.g. *B. tetrapterocarpa*) wing-like extensions do not occur on the lateral surface. However, many species have such structures extending along the ab/adaxial plane, which is the view when looking at a cypselas along the radius of the receptacle of a fruit-bearing capitulum. The fruits of most species are illustrated (Fig. 1–8), with most only displaying the lateral view. However, both the lateral and radial views are illustrated for some species, e.g. species of the *Brachyscome lineariloba* group (Fig. 4) and *Roebuckia* (Fig. 8).

Details of cypselas anatomy have been recorded for many species and transverse sections of some species are illustrated in Fig. 9–12. Sometimes it is just the number of vascular bundles in the pericarp, their presence and number usually readily ascertained from spirit material of immature fruit which have been mounted and viewed through a transmission microscope; in older fruit clearing in lactic acid may be necessary. However, the distribution of sclerenchyma, the presence or absence of secretory canals, and whether cells of the testa are thin or have u-shaped or continual thickening, were determined from transverse sections of fruit. Invariably, such observations are based on the sections of a single fruit, with the voucher specimen cited in the descriptions or in notes accompanying an account of a species.

Fruit sections revealed a number of taxonomically useful differences between taxa, but none more so than the presence or absence of large secretory canals in the pericarp (Fig. 12, E–H), a feature, which strongly supports the move of species, such as *B. cheilocarpa* and *B. ciliocarpa*, to the new genus *Roebuckia*. It also clarified that in species of *Allittia*, in which there may be two discernible longitudinal ridges on the

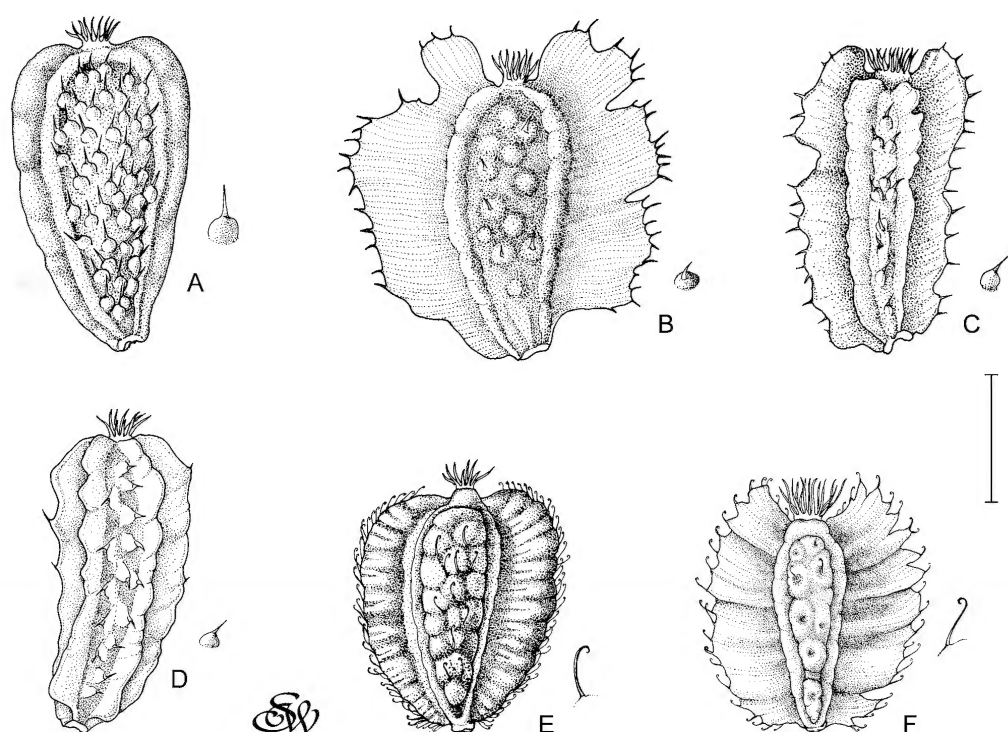


Fig. 7. *Brachyscome* cypselas. **A–D** *Brachyscome triloba* group, lateral views, each with an enlargement of an eglandular hair. **A** *B. kaputarensis* (holotype, R. Coveny 8768, NSW). **B** *B. procumbens* subsp. *procumbens* (E. Salkin AD5G 129, MEL). **C** *B. salkiniae* (holotype, N.G. Walsh 1214, MEL). **D** *B. willisii* (holotype, J.H. Willis, MEL 502478). **E** *B. whitei* subsp. *lophoptera*, lateral view, enlargement of eglandular hair (holotype, P.S. Short 3159, MEL). **F** *B. whitei* subsp. *whitei*, lateral view, enlargement of eglandular hair (A.R. Bean 9934, MEL). Scale bar: 1 mm. — Illustrated by S. Wickison.

lateral surfaces, the ridges are associated with the two vascular traces in the pericarp. In other species with two vascular bundles in the pericarp the ridges are not associated with the vascular traces, but are internal to them. Differences in the distribution of sclerenchyma tissue through the pericarp are also discernible. In many species, sclerenchyma tissue is only associated with the two vascular bundles in the ab/adaxial margins (e.g. as in all 11 species of the *B. multifida* and *B. triloba* groups that were examined, see Fig. 11C, D, 12C), but in other species it may be unevenly or evenly distributed around the body of the fruit. Sections also showed that in swollen ridges the cells are only or predominantly of large-celled parenchyma or perhaps collenchyma (Fig. 10G, H).

Thickening of the cells of the testa is also highly variable between species, cells either lacking any obvious thickening, having well-developed, continuous thickening on all walls (e.g. Fig. 10B, *B. decipiens*, or Fig. 11D, *B. multifida*), or having u-shaped thickening (with the outermost wall and lateral walls thickened, but not the innermost, e.g. Fig. 9E, *B. perpusilla*). Of

29 species with continual sclerenchymatous thickening, in 20 the testa-cells were thin-walled, five were evenly-thickened, and four had u-shaped thickening. In the seven species in the *B. lineariloba* group and the four in the *Brachystephium* group, which were examined, the sclerenchyma layer was not always well-developed, but, on the assumption that thickened cells play a part in the prevention of desiccation of the seed, then seeds in these species are also protected from water-loss by the presence of swollen longitudinal ridges. The correlation of the presence of protective pericarpic tissue and thin-walled cells in the testa is also conversely recorded in that, of the 20 species for which sclerenchyma is restricted to the ab/adaxial margins, the testa in 17 of them is composed of cells which are manifestly and continually thickened; of the remaining species two have comparatively thin-walled cells and one has u-shaped thickening.

The degree and type of thickening, or lack thereof, in the pericarp and testa is sometimes the same for all species in a group, e.g. evenly thickened testa walls and restricted thickening in the pericarp in the *B. multifida*

and *B. triloba* groups, and thin-walled testa and continual pericarp thickening in the *Brachystephium* and *B. lineariloba* groups, but can also vary between otherwise apparently closely-related species.

In recording anatomical characters of cypselas it is here assumed that, for species with monomorphic fruit, features are the same in both the ray and disc cypselas, albeit that all transverse sections were of disc cypselas. Because of their having dimorphic fruit, a multistate is recorded for some species in Appendix 2, cypselas from both ray and disc florets having been sectioned.

**35. Dimorphic cypselas:** (0) absent (monomorphic); (1) present.

For most species the cypselas of disc florets and ray florets are identical, i.e. monomorphic. However, in some taxa, such as many entities referable to the *B. ciliaris* complex, cypselas of the ray and disc florets are often manifestly and consistently dissimilar, cypselas of the ray florets being unwinged and those of the disc florets having distinct wings on the ab/adaxial margins, e.g. as illustrated for *B. rudallensis* (Fig. 2B–C). In *B. debilis*, the fruit are dimorphic between plants, some individuals consistently producing unwinged fruit, others winged fruit (Fig. 2J–K).

Within capitula some morphological variation in features such as the comparative size of cypselas and the number and degree of development of tubercles on individual cypselas may be observed. This variation is not consistently correlated with floret sex and is somewhat gradational from the outer to inner florets. Such differences are probably reflecting differences in the timing of anthesis and pollination (outer ray florets reaching anthesis before the inner disc florets) and comparative crowding of developing cypselas, e.g. as suggested for *B. nodosa* (Short & Watanabe 1993). Species with gradational variation of this nature are deemed to have monomorphic fruit.

In *Roebuckia cheilocarpa* cypselas of ray florets may or may not always lack wing-like ab/adaxial margins as found in the disc florets; in those ray cypselas with wings the wings are more developed on the inner margins than the outer margins, a situation also seen in *R. ciliocarpa*, *R. lathamensis*, *R. oncocarpa* and *R. similis*. *Brachyscome eyrensis* also exhibits a partial and inconsistent dimorphism, in this case it being in regard to the presence or absence of apical swellings and the thickness of the ab/adaxial margins in the ray florets. Because of the inconsistent dimorphism this species, and the aforementioned species of *Roebuckia*, are all coded in Appendix 2 as having monomorphic fruit.

*Brachyscome castiana* has considerably larger ray cypselas than disc cypselas but they are otherwise not that dissimilar in general morphology and it too is coded as having monomorphic fruit.

**36. Carpodium:** (0) present; (1) absent.

Usually there is a structure, often annular and several cells wide, surrounding the base of a cypselas; this is a

carpodium and a cypselas usually dehisces from the capitulum immediately below the carpodium. It is usually well-developed and often differs in colour from the fruit body. In scoring this character it appears that in two species of *Roebuckia* the carpodium is absent or very poorly developed; both species (*R. halophila* & *R. lathamensis*) were scored as “?”.

**37. Peg-like base:** (0) absent; (1) present.

In a few species the cypselas tapers towards the base and forms a peg-like structure (a modified pedicel?) by which it is attached to the receptacle. A carpodium is absent or at least poorly developed, as noted for *Roebuckia halophila* and *R. lathamensis* in (36) above.

**38. Sclerenchymatous ribs:** (0) four or more; (2) absent or ab/adaxial margins only.

Sclerenchymatous bundles which are usually visible as distinct ribs occur in many species of Asteraceae. The number of sclerenchymatous bundles is not necessarily equivalent to the number of vascular traces in the pericarp, e.g. cypselas of species in the *B. lineariloba* group lack individual ribs, but have four or more vascular bundles in the pericarp; the number of vascular traces in the pericarp is scored as a separate character.

**39. Cypselas with at least some swelling on the lateral surfaces:** (0) absent; (1) present.

Swelling occurs in an array of species and it may or may not be associated with one particular part of the cypselas; in *B. graminea* much of the entire cypselas is generally swollen; in members of the *B. iberidifolia* group it is mainly apical swelling; in other species it is associated with longitudinal and u-shaped ridges.

**40. Cypselas with a single, longitudinal ridge per lateral surface:** (0) absent; (1) present.

A single, swollen, longitudinal (and at least in part, often somewhat wing-like) ridge is normally quite evident in members of the *B. lineariloba* group (Fig. 3K, 4A–H, 10G, H), although it may be only developed in the upper part. It is suggested elsewhere (p. 106) that this feature may be derived from the merging of inversely u-shaped longitudinal ridges, as found in members of the *Brachystephium* group, the two groups sharing many other features in common.

**41. Cypselas with two, non-vascular, longitudinal ridges per lateral surface:** (0) absent; (1) present.

*Allittia cardiocarpa* and *A. uliginosa* are not scored as having longitudinal ridges despite immature, and sometimes mature, fruit of *A. cardiocarpa* possessing ridges resembling those of some other species. Cleared fruit show that these ridges are associated with the two pericarp vascular traces and are the margins from which the ab/adaxial wings extend. In other species the ridges are internal to the vascular traces (Fig. 1D, E, 4I–K, 5A, C, 6A–E, 7A–D; note that in 6D & E the colouration of the fruit may suggest continual swelling at and around the apex of the fruit where the ridges meet but this is not the case).

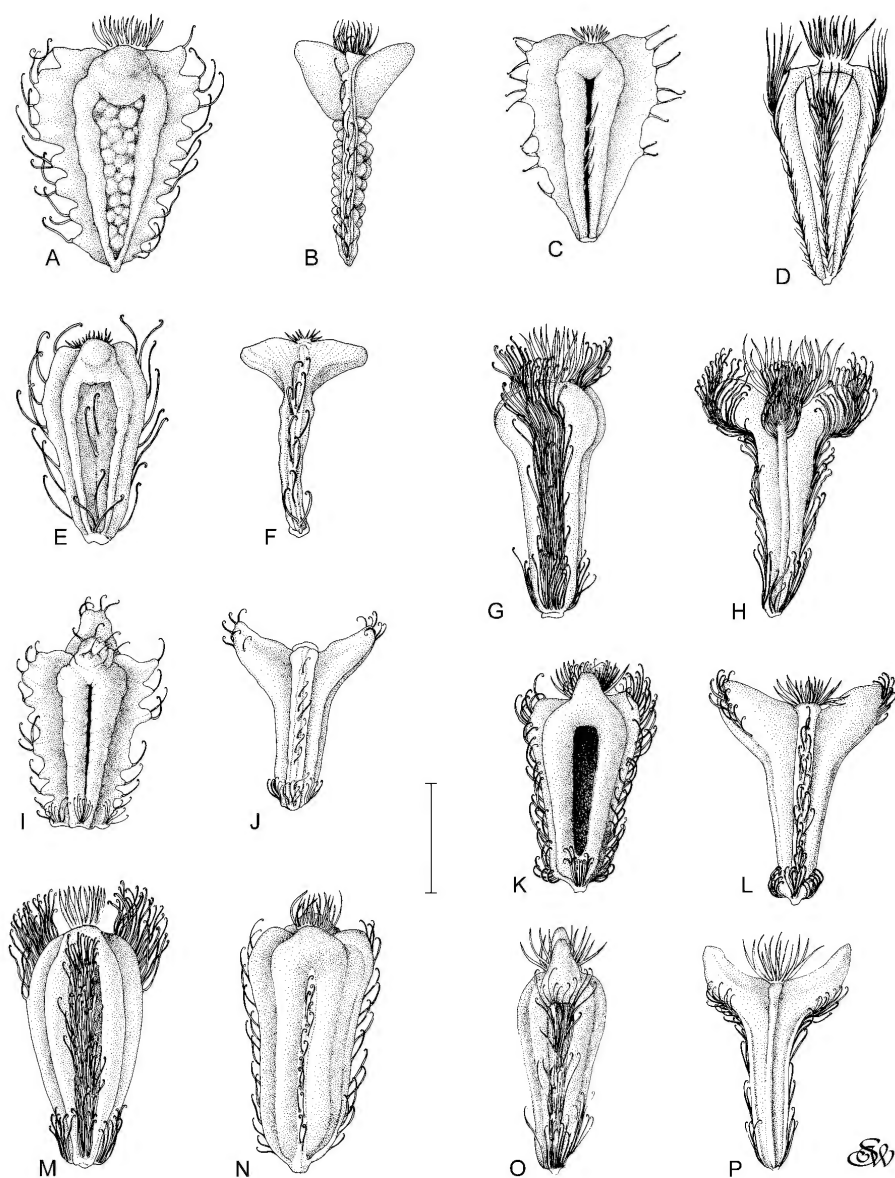


Fig. 8. *Roebuckia* cypselas. **A–B** *R. cheilocarpa* var. *cheilocarpa* (P.S. Short 2103, MEL). **A** lateral view. **B** radial view. **C** *R. cheilocarpa* var. *quobbensis*, lateral view (holotype, P.S. Short 4091, MEL). **D** *R. cuneata*, lateral view (holotype, P.S. Short 4240, MEL). **E–F** *R. chinnoekii* (holotype, R.J. Chinnoek 7985, MEL). **E** lateral view. **F** radial view. **G–H** *R. ciliocarpa* (P.S. Short 4113, MEL). **G** lateral view. **H** radial view. **I–J** *R. halophila* (P.S. Short 4101, MEL). **I** lateral view. **J** radial view. **K–L** *R. lathamensis* var. *glabrata* (holotype, P.S. Short 4120, MEL). **K** lateral view. **L** radial view. **M** *R. oncocarpa*, lateral view (P.S. Short 2042, MEL). **N** *R. similis*, lateral view (holotype, P.S. Short 3607, MEL). **O–P** *R. nerrenensis* (holotype, E.N.S. Jackson 3118, AD). **O** lateral view. **P** radial view. Scale bar: 1 mm. — Illustrated by S. Wickison.

**42. Cypselas with inversely u-shaped, non-vascular ridges:** (0) absent; (1) present.

These non-vascular longitudinal ridges are here deemed to differ from other non-vascular ridges as they are clearly apically joined and inversely u-shaped (Fig. 1G–I, 7E, F, 8A, C–E, I, K, M–O).

**43. Cypselas radially extended:** (0) absent; (1) absent and present; (2) present.

Many species display radial extensions from the pericarpic vascular bundles. In some the entire fruit is manifestly flattened and very thin, in others the fruit is less compressed. Such extensions are frequently described as “wings” although that term is also commonly applied to the central extensions which occur on the lateral surfaces of some fruit of *Brachyscome* s.lat. and are scored here as a separate character (45).

**44. Cypselas lateral surfaces tuberculate:** (0) absent; (1) absent or present; (2) present.

Except for swollen hair bases, microscopic papillae, and longitudinal ridges the lateral surfaces of the fruit may be more or less smooth. However, in many species the surfaces are tuberculate. Tubercles vary greatly in their size, placement and frequency. Many tubercles terminate in eglandular hairs.

Tubercles are mostly lump-like but they are flattened and tooth-like in *B. papillosa*. They usually vary little in shape within any species, but in polyploid *B. dentata* the tubercles are variable, being small in, for example *P.S. Short 1311*, or large and sometimes even flattened and in some specimens may exhibit considerable variation, even within the one capitulum (e.g. *P.S. Short 3755*).

*Brachyscome whitei* is not considered to have tubercles on the lateral surface. They are present, though not scattered over the face of the surfaces, but are confined to a central wing-like extension from each of the surfaces. As with Davis (1948), I interpret this wing-like structure to be formed of a number of large tubercles which have coalesced.

**45. Cypselas lateral surfaces with central extension:** (0) absent; (1) present; (2) thin wing; (3) tuberculate wing.

In many species (e.g. *B. graminea*, *B. obovata*) there is no obvious “join” where I assume the two carpels that make up the gynoecium meet. However, in quite a number there is a distinct and sometimes extremely prominent longitudinal line running through the middle-length of the cypselas. In some cases, it is represented by a line of hairs or small tubercles (1) (Fig. 4I–K, 6A, B, D), while in *B. tetrapterocarpa* there is a wing (2) (Fig. 3C); in *B. whitei* it exists as a swollen, tuberculate wing (3) (Fig. 7E, F).

**46. Cypselas ab/adaxially curved towards the central axis of the capitulum:** (0) absent; (1) present.

This applies to many species of the *Brachystephium* group (Fig. 1F, H, I) and the *B. lineariloba* group (Fig. 4A, C, E, G), in which the cypselas in the intact

capitulum are curved toward the central axis of the receptacle.

In species such as *B. curvicaarpa* the cypselas in the intact capitulum are not curved toward the central axis of the receptacle, but at right angles to the radius. This curvature is correlated with incurved wings, the latter scored as a separate character (47).

**47. Cypselas strongly curved at right angles to the radius:** (0) absent; (1) present.

*Brachyscome chrysoglossa* is variable for this feature and is scored as “0, 1”. For notes concerning the presence of curved cypselas in the *B. ciliaris* complex, see under the notes for *B. dimorphocarpa*. Examples of species with this feature are illustrated in Fig. 2H, I, 3A, C, 4I–K.

**48. Cypselas lateral surfaces concave:** (0) absent (flat to convex); (1) present.

This is a feature, which unites various members of the *B. iberidifolia* species complex — including entities from Mt Chudalup, Cosy Corner and Yellowdine, referred to in the notes under the treatment of that species — and the similar *B. pusilla*. All species have very broad ab/adaxial margins (Fig. 3E–G, 10F).

**49. Cypselas lateral surfaces tessellated:** (0) absent; (1) present.

Only definitely recorded in *B. bellidioides* (Fig. 3D), but perhaps, some entities in *B. iberidifolia* s.lat. and with non-mature fruit may prove to have a tessellated surface, as distinct from a minutely papillate surface (50) which is commonly encountered.

**50. Cypselas surfaces minutely papillate:** (0) absent; (1) present.

Cypselas sometimes have minutely papillate surfaces and this is highlighted in Fig. 10F. Anatomical sections show such papillae to be the result of the inclusion of crystals in cells of the outer wall of the pericarp. I am not convinced that their presence is necessarily a constant feature in all taxa for which this character is scored as being present; my observations should be treated with caution.

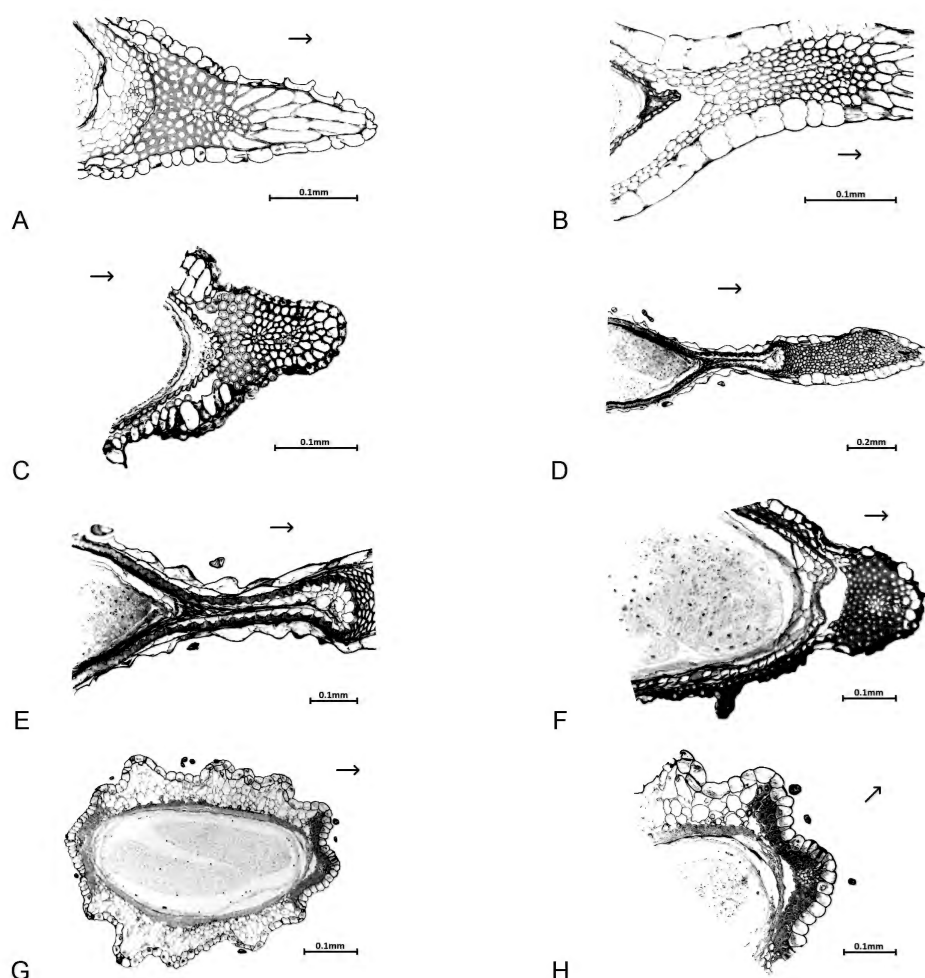
**51. Cypselas with glabrous, apical cap:** (0) absent; (1) present.

This feature has been scored for *B. billabongensis*, *B. gilesii* and *B. simulans* (Fig. 3I, J).

**52. Cypselas ribs and margins differently coloured to body of fruit:** (0) absent (monocolorous); (1) present (discolorous).

Some species have ribs, ridges or radial extensions, which may be consistently darker in colour than the body and these are considered to have discolorous fruit; in others the fruit is essentially the same colour throughout or any differences are not definitely and consistently associated with any part of the fruit. Such fruit are here deemed to be monocolorous.





**Fig. 9.** Transverse sections of cypselas of *Allittia* and *Brachyscome*. **A** *Allittia cardiocarpa* (P.S. Short 3238, MEL); ab/adaxial margin with wing-like extension and part of seed; sclerenchyma restricted to ab/adaxial margins; testa cells with u-shaped thickening. **B** *Brachyscome aculeata* group: *B. B. aculeata* (K.C. Rogers, MEL 503490); part of an ab/adaxial margin, sclerenchyma not extending into wing-like extension; testa cells evenly thickened. **C** *Brachyscome basaltica* group. **C** *B. paludicola* (H.I. Aston 2336, MEL); ab/adaxial rib with major sclerenchymatous thickening; testa cells with u-shaped thickening. **D–H** *Brachyscome ciliaris* group. **D–E** *B. perpusilla* (P.S. Short 2790, MEL). **D** showing part of seed and the wing-like, ab/adaxial, sclerenchymatous margin. **E** an enlargement of the former highlighting the testa cells with prominent u-shaped thickening. **F** *B. tatei* (P.S. Short 2421, MEL); partial section displaying prominently thickened ab/adaxial ribs and lateral surfaces with a single-celled layer of sclerenchyma in the pericarp and testa cells with u-shaped thickening. **G–H** *B. trachycarpa* (J.Z. Weber 6594B, AD). **G** section displaying a continual layer of sclerenchyma surrounding the seed and with tubercles on the lateral surfaces. **H** enlargement of the former; testa cells with u-shaped thickening. — Arrows show orientation of cypsel along the radial axis of the receptacle.

**53. Cypselas charcoal black:** (0) absent (shades of brown, grey, purplish-black); (1) present.

In species such as *B. melanocarpa*, the cypselas are distinctly charcoal black. Some species of *Brachyscome* s.lat., for example *B. campylocarpa*, *B. smithwhitei* and *B. tetrapterocarpa* have cypselas which, seemingly at full maturity, are brown or black. However, the black colouration is a purplish-black, not a distinct charcoal

black, and therefore these species are scored as “0”.

**54. Cypselas grey:** (0) absent (shades of brown, purplish-black, charcoal black); (1) present.

**55. Cypselas viscid:** (0) absent; (1) present.

Many species have glandular hairs on their cypselas, but these are usually few in number, inconspicuous and often absent from mature fruit. This is in contrast to the,

at least apically, markedly viscid cypselas encountered in *B. graminea*, *B. radicata*, *B. thomsonii* and *B. papuana*.

**56. Cypselas strongly reflexing at maturity:** (0) absent; (1) present.

This is a particularly difficult character to score with certainty as collections with very mature fruit are not always available in herbaria or seen in the field, or, if they have been viewed, then the sample size is small. Thus, the observations of species with reflexed fruit are definitely correct, but a score of "0" may prove to be incorrect. Taxonomically it seems useful in the *B. iberidifolia* group in suggesting a close relationship of the three species, *B. billabongensis*, *B. simulans* and *B. gilesii*.

#### Glandular and eglandular hairs on cypselas

The structure of the glandular hairs has not been thoroughly examined for cypselas and the only feature pertaining to them and recorded here is the viscosity of cypselas noted above (55).

Eglandular, biseriate ("twin") hairs occur on cypselas in the majority of taxa; they may be straight or curved and apically may be acute or obtuse, entire or bifid to long-forked, or apically curled (inrolled).

**57. Eglandular hairs:** present (0); absent(1).

**58. Biseriate, weak, bifid:** (0) absent; (1) present.

*Brachyscome decipiens* only (Fig. 2F).

**59. Biseriate, long-forked:** (0) absent; (1) present.

More rigid than in *B. decipiens* and forked for much of their length as in *B. multifida* s.str.

**60. Biseriate, somewhat curved but not obviously bifid:** (0) absent; (1) present.

This and the following character are usually clear-cut, but also somewhat subjective. *Brachyscome procumbens* and *B. riparia* are examples in which both hair types may occur on the one cypselas.

**61. Biseriate, straight:** (0) absent; (1) present, not bifid; (2) bifid although not usually obvious.

**62. Biseriate, apically-curved:** (0) absent; (1) present.

Many species have twin hairs with inrolled apices and are generally referred to in descriptions as being apically-curved. They are usually readily distinguished from those hairs which are distinctly curved, but *Allittia uliginosa* has hairs which are strongly curved and some which have slightly inrolled apices; in Appendix 2 it is scored as "?" for this character.

#### Pericarp

**63. Number of vascular traces in the pericarp:** (0) four or more; (1) two.

All species have at least two vascular traces, i.e. one in the abaxial and one in the adaxial margin. Those with four or more traces or bundles have ab/adaxial bundles plus two or more on the lateral surfaces.

Vascular bundles are best observed in fruit cleared in lactic acid or in sectioned and stained specimens, but are often visible in flattened, immature fruit obtained from dried herbarium specimens and, in particular, specimens stored in alcohol. The presence and number of vascular bundles recorded here for each taxon were mostly scored from both cleared fruit and anatomical sections of mature fruit.

*Brachyscome smithwhitei* appears to have two or sometimes four or more bundles and is scored as "?".

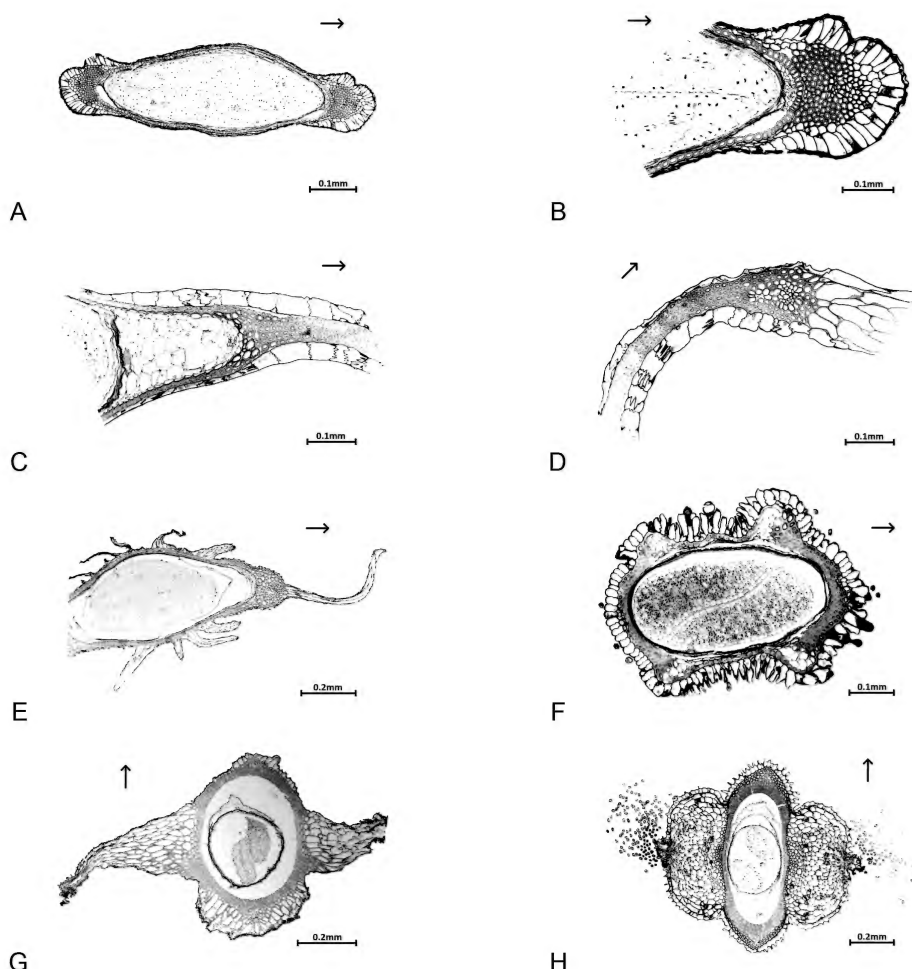
**64. Secretory canals in the pericarp:** (0) absent; (1) present.

Secretory canals or cavities are found in a handful of species. In species here referred to the genus *Roebuckia*, large secretory canals are a prominent feature of transverse sections of cypselas (Fig. 12, E–H). The canals are also discernible in cypselas that have been cleared in lactic acid, a narrow, but long canal being visible for about the length of the fruit. The canals are external to vascular bundles in the ab/adaxial ribs. They may also occur on the lateral surfaces (faces) of fruit of these species, but in such cases are not always associated with vascular bundles.

Possible secretory cavities or canals have also been observed in *B. diversifolia*, *B. segmentosa* and *B. whitei*. In *B. diversifolia* a single canal extending for about half the length of the fruit was observed in cleared cypselas of var. *maritima*, but in transverse sections appeared as a somewhat ill-defined structure and, although external to the pericarpic vascular bundle, it does not seem to be structurally equivalent to those observed in *Roebuckia*. Two such canals were observed in cleared fruit of *B. segmentosa*. As there is doubt that these structures are homologous with the canals in *Roebuckia*, both species were scored as "?" for this character. In *B. whitei*, transverse sections of fruit revealed a space internal to each of the pericarpic vascular bundles, but it is not clear whether the space is the result of the removal of additional vascular tissue when the cypselas were sectioned or whether there is a canal. (The inner surfaces of each cavity have a few scattered fibres internal to the parenchyma cells that otherwise form the boundary of the cavity.) It too is scored as "?" for this character.

**65. Pericarp sclerenchyma:** (0) absent; (1) present.

The distribution of sclerenchyma in the pericarp is highly variable between species, as too is the distribution of collenchyma and parenchyma. It is difficult to meaningfully classify such distribution, partly, because such information is only available for some species, and partly, because a classification of distribution of tissue types is somewhat subjective. For example, in numerous species the sclerenchyma is essentially restricted to the vicinity of the ab/adaxial margins, with both margins generally conspicuous as a distinct rib. However, such ribs vary in prominence and the extent to which they are composed of sclerenchymatous tissue varies; for example, in many species in the *B. iberidifolia* group



**Fig. 10.** Transverse sections of cypselas of *Brachyscome*. **A–B** *Brachyscome decipiens* group. **A–B** *B. decipiens* (D.E. Albrecht 254, MEL); **A** full section showing prominently thickened ab/adaxial ribs; lateral ridges and tubercles lacking. **B** enlargement of former showing lateral surfaces lacking sclerenchyma; testa cells with evenly and prominently thickened walls. **C–E** *Brachyscome dentata* group. **C–D** *B. curvica* (P.S. Short 3554, MEL). **C** basal part of wing-like extension from ab/adaxial margins; testa cells with u-shaped thickening. **D** upper part of wing-like extension from ab/adaxial margins, only a small part lacking sclerenchyma. **E** *B. papillosa* (W.T. Parsons 1949, MEL), majority of fruit section displaying wing-like extensions on ab/adaxial margins which lacks thickened cells; scale-like tubercles on lateral surfaces prominent, cells non-thickened. **F** *Brachyscome iberidifolia* group. **F** *B. iberidifolia* (L. Haegi 2552, MEL), entire section displaying thick layer of sclerenchyma at each end and a continual thinner layer on the lateral surfaces; lateral surfaces with distinctive papillate epidermal cells; testa cells thin-walled. **G–H** *Brachyscome lineariloba* group. **G** *B. campylocarpa* (R. Filson 3205, MEL), entire section displaying swollen lateral surface of large-celled parenchyma; an inner, continual layer of sclerenchyma extending around the seed but this thicker on the ab/adaxial margins; testa cells thin-walled. **H** *B. eriogona* (P.S. Short 3121, MEL), entire section displaying a single, swollen lateral rib on each surface consisting of large-celled parenchyma, but pericarp with an inner, continual layer of sclerenchyma. — Arrows show orientation of cypsel along the radial axis of the receptacle.

the ribs are quite broad and almost totally composed of sclerenchymatous tissue (e.g. *B. iberidifolia*, Fig. 10F), while in others the ribs are only partially composed of sclerenchymatous tissue and much of that is in close association with the vascular bundle. In species with winged cypselas the sclerenchyma may extend partly or fully (e.g. in *Pembertonia*, Fig. 12D) into the

wing. In other cases the sclerenchymatous tissue may only be partly distributed across the surface, as for example in *B. radicans*, where the small gap between the sclerenchyma in the ribs and that on the surface is perhaps associated with water uptake and splitting of the pericarp at germination.

Thus, although there is considerable variation in

the distribution of tissue types, in Appendix 2, I only score the presence or absence of a continual layer of sclerenchyma around the seed, as determined by transverse sections.

**66. Testa:** (0) *u-shaped*; (1) *evenly thickened*; (2) *thin*.

For details and discussion of this character see the above introductory notes to cypselar morphology and anatomy immediately following character 34.

**Pappus and dehiscent zone between the corolla and ovary**

The absence or presence of pappus dimorphism has not been recorded in Appendix 2, with the pappus essentially identical in both ray and disc florets in all species. However, it is manifestly dimorphic in *B. rudallensis*, a species in which the cypselas are also dimorphic. Thus, the pappus of ray florets is a whitish, divided crown c. 0.06–0.08 mm high, while that in the disc florets consists of about ten, unevenly-long, smooth, whitish elements c. 0.1–0.35 mm long.

**67. Pappus:** (0) *absent*; (1) *present (short)*; (2) *present (papillose ring)*.

A pappus is clearly present in many species and clearly absent in others. However, sometimes it appears to be absent, but the presence of a few minute cells around the apex of the mature cypselar leaves this open to question. I suspect such cells are nothing more than remnant cells from the base of the corolla tube and in such cases have scored a “?” for this character, e.g. as in *B. bellidioides*.

In regard to type (1) this is the non-barbed, mostly bristle-like pappus which is less than c.  $\frac{1}{3}$  the length of the disc corolla. Given the commonality of long pappus bristles in many other members of the tribe, the shortened version found in most species attributed to *Brachyscome* s.lat. is presumably a derived character state.

It is the presence of this short pappus that has meant the referral of many species to *Brachyscome* s.lat., despite there being an array of other character differences, including cypselar structure, which suggests that it is a feature derived more than once. Indeed, there is some variation in the structure of the pappus, as for example in the *B. lineariloba* group, in which the bracts are scale-like in some species but not others. I suspect that the grouping of the species together as a result of their sharing a reduced-pappus is akin to the grouping of the many Australian species once referred to the genera *Helichrysum* Miller or *Helipterum* DC., because they had either essentially barbellate bristles or plumose bristles; they have since been placed in a number of different genera following the study of other characters (e.g. Wilson 1992).

Type (2) is the small, somewhat papillose ring found in the *B. basaltica* group.

**Reproductive biology**

Pollen:ovule ratios are the main, if not only, component in the notes on reproductive biology provided in the descriptions of taxa, it now being well-known (e.g. Cruden 1977; Short 1981) that they are a good guide as to whether a plant commonly self-pollinates and self-fertilises or if it is more likely that seeds are the result of cross-pollination and fertilisation between different plants. In the majority of species examined here pollen:ovule ratios are commonly much more than 1,000 (usually 2,000–3,000), a value suggesting that cross-pollination between plants is quite likely. However, it doesn't mean that such plants are necessarily self-incompatible, although this has been reported to be the case for *B. dichromosomatica* (e.g. Watanabe & Smith-White 1987); in contrast *B. muelleri* is self-compatible (Jusaitis et al. 2003). Only a few species, i.e. *B. goniocarpa* in the *Brachystephium* group, *B. glandulosa* and *B. perpussilla* in the *B. ciliaris* group, *B. breviscapis*, *B. lineariloba* “B”, *B. lineariloba* “C” and *B. lineariloba* “E” in the *B. lineariloba* group, and the New Zealand species *B. linearis* in the *Paquerina* group, have pollen:ovule ratios of several hundred. Such values are generally indicative of self-compatibility and self-fertilisation and this has been confirmed (e.g. Watanabe & Smith-White 1987) in *B. goniocarpa*, *B. breviscapis* and the three cytodesmes (B, C & E) of *B. lineariloba*.

Following the classification outlined below it is evident that taxa with low pollen:ovule ratios have independently evolved on several occasions within *Brachyscome* s.lat.; with the exception of *B. linearis*, a New Zealand species, all such taxa are annuals.

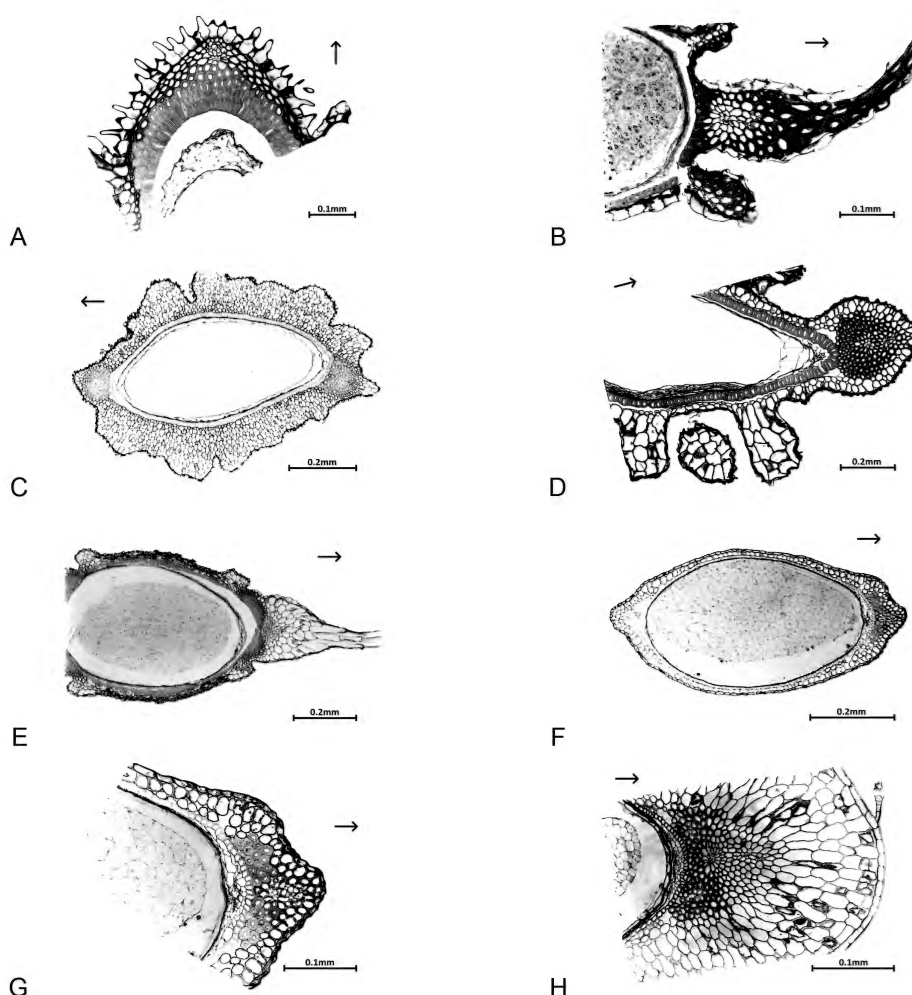
**68. Pollen:ovule ratios:** (0) *greater than 1,000*; (1) *less than c. 500*

Pollen:ovule ratios were determined for almost all species. However, for members of the Astereae, whether values are relatively high or low is usually apparent from generally correlated attributes, i.e. the size of flowering capitula, the length and number of ray corollas, the relative number of disc and ray florets in a capitulum, and the number and size of anthers. Such attributes are included in individual descriptions of species and, in part, in Appendix 3.

In members of the *Brachyscome ciliaris* complex high numbers of pollen are formed but there may be a high percentage of sterility and this varies between entities. These are recorded as “?”. On the other hand, in the apparent absence of fertile pollen, *B. dalbyensis*, *B. rudallensis* and *B. trachycarpa* are scored as “–” in Appendix 2, i.e. as inapplicable, these being apomictic taxa and scored as such in character 69.

**69. Apomictic:** (0) *absent*; (1) *present*.

Davis (1963, 1964), and subsequently others (e.g. Carter 1978a, Watanabe & Short 1992) have recorded that most members of the *B. ciliaris* complex are apomictic taxa. Davis (cited in Smith-White et al. 1970)



**Fig. 11.** Transverse sections of cypselas of *Brachyscome*. **A** *Brachyscome lineariloba* group, cont. **A B. eriogona** (P.S. Short 3121, MEL), an enlargement of Fig. 10H showing an ab/adaxial rib, the epidermal cells minutely papillate; testa with thin-walled cells. **B** *Brachyscome muelleri* group. **B B. muellerioides** (T.B. Muir 4701, MEL); part of cypselas showing curving ab/adaxial wing and longitudinal ridges with well-developed sclerenchyma; testa cells thin-walled. **C–D** *Brachyscome multifida* group. **C B. melanocarpa** subsp. *melanocarpa* (P.S. Short 2433, MEL), entire section showing sclerenchyma confined to ab/adaxial ribs; tubercles present on lateral surfaces, testa cells evenly-thickened. **D B. multifida** (P.S. Short 3942, MEL); partial section showing large tubercles and sclerenchyma confined to ab/adaxial ribs; testa cells evenly-thickened. **E** *Brachyscome nivalis* group. **E B. nivalis** (R. Melville 2603, MEL), majority of a section displaying 2 longitudinal ridges on each surface and part of a winged extension lacking sclerenchyma; fruit body with sclerenchyma immediately surrounding the vascular bundles and extending under the lateral ridges and then thinning before continuing along the lateral surfaces; testa with thin-walled cells. **F–H** *Paquerina* group. **F–G B. foliosa** (N. Scarlett 83-70, MEL). **F** externally smooth cypselas lacking ridges and tubercles. **G** enlargement of former showing testa of somewhat u-shaped to evenly thickened cells. **H B. graminea** (P. Heyligers 84001, MEL); section of an ab/adaxial rib showing a vascular bundle and associated sclerenchyma and surrounding parenchyma; testa cells evenly thickened. — Arrows show orientation of cypselas along the radial axis of the receptacle.

recorded that *B. dentata* is a facultative apomict, but subsequent observations by Watanabe & Short (1992) did not support this report. Sharma & Murty (1977) recorded *B. iberidifolia* as being a “casual apomict”; this has not been confirmed.

### Chromosome numbers

There has been considerable work carried out on the cytology of *Brachyscome* s.lat., from basic reports on chromosome number determinations to detailed studies of meiotic behaviour (including B chromosomes) and

the presentation of idiograms of somatic metaphase chromosomes of many of the species (especially Watanabe et al. 1999). Records of chromosome numbers and illustrations, all referenced, are summarised below under the treatment of individual species.

Chromosome numbers of Australian Astereae are summarised by Watanabe et al. (1996b) and it is from that paper that most data are drawn, although an additional determination of  $2n = 28$  for *B. tadgellii* is from Watanabe et al. (1999). Data for New Zealand species comes from Beuzenberg & Hair (1984), Dawson & Beuzenberg (2000), de Lange & Murray (2002) and the New Zealand Plant Conservation Network website. It is assumed that the reported count of  $2n = 36$  and  $37$  by Beuzenberg & Hair (1984) and Dawson & Beuzenberg (2000) for *Brachyscome humilis* is derived from a base of  $x = 9$ .

Of the many voucher specimens cited by Smith-White et al. (1970), most have been viewed, the specimens being housed in SYD, but a few are no longer extant (Prof. Roger Carolin, in litt., c. 1988).

The haploid number, or apparent base number for polyploids, is scored for all taxa, it usually being readily apparent from the extensive documentation within *Brachyscome* s.lat. when taxa are polyploids. Within the *B. lineariloba* group it has been hypothesised (Watanabe & Smith-White 1987) that *B. breviscapis* ( $n = 4$ ) is of amphidiploid origin between two species with  $n = 2$  and that other members with ( $2n = 10, 12, 16$ ) are also amphidiploids or quasidiploids.

**70. Chromosome number  $n$  or  $x = 9$ :**

(0) absent; (1) present.

**71. Chromosome number  $n$  or  $x = 8$ :**

(0) absent; (1) present.

**72. Chromosome number  $n$  or  $x = 7$ :**

(0) absent; (1) present.

I have wondered if *B. tadgellii*, which has  $2n = 28 + 0-2Bs$  should or could be scored as having a base number of seven, but as other members of the *B. nivalis* group have  $n = 11, 13$  &  $15$ , this is perhaps unlikely.

*Brachyscome foliosa* has  $n = 14$  and given that it is grouped with other species with  $n = 9$  it seems likely that it has a base of  $x = 7$ .

**73. Chromosome number  $n$  or  $x = 6$ :**

(0) absent; (1) present.

**74. Chromosome number  $n$  or  $x = 5$ :**

(0) absent; (1) present.

**75. Chromosome number  $n$  or  $x = 4$ :**

(0) absent; (1) present.

**76. Chromosome number  $n$  or  $x = 3$ :**

(0) absent; (1) present.

**77. Chromosome number  $n = 2$ :**

(0) absent; (1) present.

## Text Notes

### Notes on typification

Davis (1948, 1949a, b, 1955, 1959) generally adopted the terminologies of types as defined in Davis & Lee (1944) and also used the term “haptotype”, “which [was] applied to a specimen bearing the type data, but about which there exists some doubt that it was actually handled by the original author” (Davis 1948, p. 144). As she nominated lectotypes elsewhere in her publications this, the nomination of a haptotype, is not regarded to be the same as choosing a lectotype.

When describing new species, Davis never nominated a sheet containing two or more elements as the holotype specimen, preferring to nominate a single element (frequently a whole plant, sometimes a branchlet) as the holotype specimen. Any remaining elements on the same sheet, and on sheets containing duplicate material from the same gathering, were deemed to be paratypes. (For a case involving both Davis and J.H. Willis, see treatment of *B. eyrensis*.) Davis also chose a single element when nominating lectotypes of many names, calling other specimens of the same gathering, as well as those from different gatherings mentioned in the protologue, “lectoparatypes”. To be in accordance with the ICN the remaining elements on a sheet containing the holotype specimen as designated by Davis are isotypes. Similarly, the remaining elements on a sheet after Davis designated a lectotype specimen, are isoelectotypes.

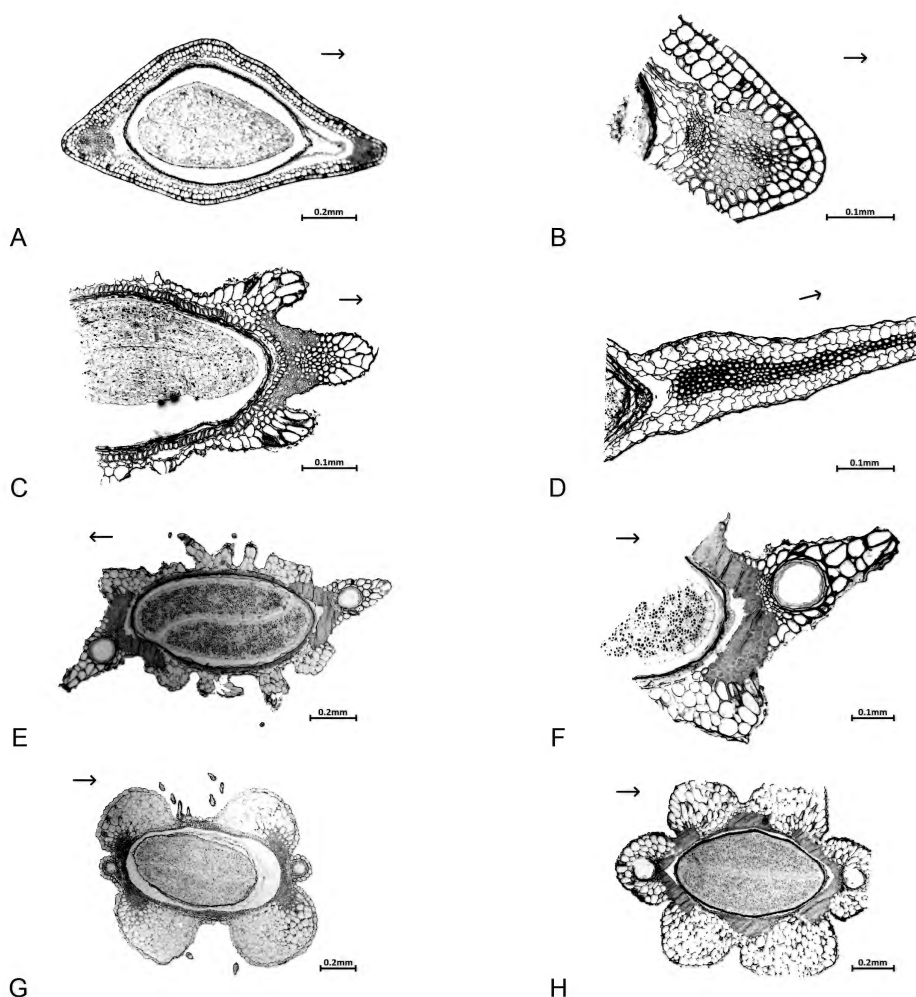
When citing details of type specimens I usually give the specimen citation as provided in the protologue and this is often followed by updated citation of details of the appropriate specimen(s). This is because, particularly in regard to early publications, such as those by Ferdinand Mueller, there are often discrepancies between collection data provided in the protologue and that on the label of the undoubted type specimen, the identity of a type usually being obvious from other annotations.

Apart from citation in her revision, for anyone wishing to ascertain whether a specimen of *Brachyscome* was examined by Davis, I note that she did not always initial her determinations. However, her determinations are distinctive in that they are usually written directly on the sheet or label in blue ink.

Bentham (1837) named seven species of *Brachyscome* in *Enum. Pl. Hügel*. One name, *B. iberidifolia*, was based on a specimen collected by Baron von Hügel. The others, *B. glabra*, *B. heterophylla*, *B. leucanthemifolia*, *B. marginata*, *B. oblongifolia* and *B. tenera*, were based on specimens gathered by Ferdinand Bauer. Usually, each name appears to be based on a single collection. Bentham, in his preface to *Flora Australiensis*, stated that

With regard to the originals of the species described in Baron Huegel's 'Enumeratio Plantarum' and other works, published at Vienna, I was enabled to bring over with me specimens of several, especially of those which I had myself described [.]

Bentham (1863), p. 11 of preface



**Fig. 12.** Transverse sections of cypselas of *Brachyscome*, *Pembertonia* and *Roebuckia*. **A–B** *Paquerina* group, cont. **A–B** *B. scapigera* (R. Jackson, CBG 179). **A** section showing lack of longitudinal ridges; sclerenchyma restricted to ab/adaxial margins. **B** enlargement of former showing testa with evenly thickened cell walls. **C** *Brachyscome triloba* group. **C** *B. petrophila* (J.H. Willis s.n., MEL 1580307), partial section displaying two longitudinal ridges; highly thickened sclerenchyma confined to ab/adaxial margins and partial base of lateral ridges; testa cells prominently and evenly thickened. **D** *Pembertonia latisquamea* (P.S. Short 2054, MEL), section showing the major part of a wing-like margin and displaying sclerenchymatous core; testa cells with prominent u-shaped thickening. **E–H** *Roebuckia*. **E–F** *R. cheilocarpa* var. *cheilocarpa* (P.S. Short 2026, MEL). **E** section showing secretory canals in the ab/adaxial margins and with multiple layers of sclerenchyma extending from the margins into the base of the longitudinal ridges, a 1-celled layer of sclerenchyma on the lateral surfaces. **F** an enlargement of the former showing detail of secretory canal; testa cells with u-shaped thickening. **G** *R. cillocarpa* (P.S. Short 2160, MEL), section showing secretory canals in the ab/adaxial margins, and with multiple layers of sclerenchyma extending from the margins into the base of the highly expanded longitudinal ribs on the lateral surfaces, with an entirely or mostly 1-celled layer of sclerenchyma on the lateral surfaces; tubercles absent; testa cells thin-walled. **H** *R. halophila* (P.S. Short 2193, MEL), section displaying secretory canals in the ab/adaxial margins, and with multiple layers of sclerenchyma extending from the margins into the base of the highly expanded longitudinal ribs on the lateral surfaces, sclerenchyma extending along the lateral surfaces multi-layered in the gap between the longitudinal ridges; tubercles absent; testa cells thin-walled. — Arrows show orientation of cypselas along the radial axis of the receptacle.

a statement indicating that the principal type, the holotype, should be considered to be in W, with possible duplicates (isotypes) in K. Indeed, for all of the above species there is a type specimen in K but, as may be

expected from Bentham's statement, the specimens in W are generally better and often far superior. In the case of Bauer specimens, accompanying labels on the K sheets indicate that the duplicates were acquired from "Herb.

Mus. Vind.” in 1836, while the label accompanying the K specimen of Hügel’s collection of *B. iberidifolia* indicates that it was acquired from “Herb. Mus. Vind.” in 1837. Thus, for most of these species I record the holotype specimen as being at W, with an isotype at K. However, for both *B. iberidifolia* and *B. tenera*, both represented at W by two sheets, I have merely recorded where type specimens are housed. In both cases I cannot be absolutely certain that they are duplicates of the same gathering – but equally I can’t say that they are not – and in any case selection of a lectotype is unnecessary as, for each name, all elements are of the same taxon.

#### Herbarium abbreviations and citation

Herbarium abbreviations follow Thiers (2010).

I examined a number of type specimens from European and North American herbaria prior to their specimens receiving herbarium sheet numbers. With the subsequent advent of various herbarium websites, in particular the K herbarium catalogue website ([apps.kew.org/herbcat/navigator.do](http://apps.kew.org/herbcat/navigator.do)) and the JSTOR Plant Science website ([plants.jstor.org/](http://plants.jstor.org/)) I have since been able to add sheet numbers for quite a few specimens. I have usually done this without indicating the source of the number, only referring to websites in cases where I have not had the opportunity to microscopically examine a specimen. For all other cited specimens it should be assumed that I have seen them unless otherwise indicated by “n.v.”. It should be noted that, in not having institutional access, I have not corrected occasional errors or misinterpretations pertaining to specimen records on the JSTOR site. If collection dates and specimen numbers are absent from specimen data, as they frequently are from early collections, this is not indicated by “s.dat.” and “s.n.”.

#### Specimens examined

Three to five representative specimens are usually cited of each taxon for each State. For species, particularly new species, for which there are fewer than about ten collections, I usually cite all specimens examined. On occasions I have refrained from citing specimens, because the species delimitation is such that it is somewhat meaningless, this being particularly so for some members of the *B. ciliaris* group and the *B. iberidifolia* group. Type specimens are not cited in specimens examined.

#### Distribution

I give a brief summation of the distribution of each taxon, but do not provide maps. For distribution I suggest accessing Australia’s Virtual Herbarium ([chah.gov.au/avh/](http://chah.gov.au/avh/)). Maps displayed there should be more up-to-date than anything I can provide as, although my field work substantially added to the number of specimens used to compile this review, I received few additional specimens on loan after receipt of major loans from Australian herbaria about 20 years ago.

#### Measurements and terminology

Accurate determinations of floret number and size cannot be easily obtained from herbarium specimens without destroying capitula. However, for many species it has been possible to obtain such determinations from spirit collections expressly collected for this purpose, as well as for the determination of pollen:ovule ratios and the study of anthers and styles. This usually means that such information has been obtained from 5–15 individuals from a population and, in some cases, from more than one population of a species. This information has then been supplemented by counts and measurements from herbarium specimens, thus expanding the likelihood that the range of variation of characters is accounted for. However, when few specimens – be they spirit or dried collections – were available I have used the abbreviation “c.” in descriptions.

Throughout this review Stearn (1983) has been a major source of terminology, as has been the terms for shapes as used by the Systematics Association Committee for Descriptive Terminology (1962), the latter simplified in a most useful table in Radford et al. (1974).



**Key to *Brachyscome* s.lat., including recently segregated genera**

1. Involucral bracts in 2 distinct rows, the outer row obviously shorter than the inner
  2. Cypselas with multiple vascular ribs on the lateral faces (New Caledonia) ..... **Pytinicarpa** (see Nesom 1994, 2001)
  - 2: Cypselas lacking multiple vascular ribs on the lateral faces (Australia, New Guinea & New Zealand)
    3. Woody, often scandent, shrub; style of disc florets with long, oblong appendages ..... **Pembertonia** (p. 169)
    - 3: Herb, non-woody; style of disc florets without long, oblong appendages
      4. Glaucous, branching perennial herb; disc florets male ..... **Hullsia** (p. 168)
      - 4: Non-glaucous, scapose or scapiform herb; disc florets bisexual
        5. Scapiform herbs with long, coarse, septate, brownish hairs at the base of the leaves; cypselas thin and with ab/adaxial wing-like margins ..... **Allittia** (p. 26)
        - 5: Scapose herbs lacking coarse, septate, brownish hairs at the base of the leaves; cypselas laterally compressed, lacking ab/adaxial wing-like margins ..... **Brachyscome** [*B. decipiens* only] (p. 80)
- 1: Involucral bracts appearing to be in 1 or c. 2 rows of about equal length or inner bracts shorter than the outer ones
  6. Anthers lacking terminal appendages; style appendages somewhat oblong in outline; cypselas with 2 swollen (along most of the length or apically) longitudinal ridges on each lateral surface, ridges apically joined and therefore u-shaped; leaf segments commonly linear; annual herbs ..... **Roebuckia** (p. 169)
  - 6: Not with the above combination of characters; anthers with or without terminal appendages; style appendages usually somewhat triangular in outline; cypselas lacking 2 swollen or partly swollen longitudinal ridges on the lateral surfaces or if present then anthers with terminal appendages; leaf segments linear or otherwise; annual or perennial herbs or subshrubs ..... **Brachyscome** (p. 27)

**Taxonomy*****Allittia* P.S.Short**

Muelleria 20: 54 (2004). — **Type:** *Allittia cardiocarpa* (F.Muell. ex Benth.) P.S.Short (syn.: *Brachyscome cardiocarpa* F.Muell. ex Benth.).

*Brachyscome cardiocarpa* group: P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 842 (1999).

Perennial, non-rhizomatous, tufted (scapiform) herbs with mostly basal leaves. *Leaves* entire or pinnatisect and with 1–6 lobes, mainly glabrous but at least the lower leaves with long, coarse, septate, brownish hairs at the base. *Scapes* with some leaves which reduce in length up the scape, the flowering scape longer than the leaves. *Capitula* solitary, heterogamous, radiate. *Involucre of bracts* in c. 2 distinct rows, margins scarious, glabrous. *Receptacle* convex or somewhat conical, glabrous, alveolate. *Ray florets* female. *Ray corolla* white or bluish. *Disc florets* bisexual; corolla 5-lobed, yellow. *Stamens* 5, anthers with an apical appendage. *Style* with sterile apical appendages shortly deltate or triangular and about the length or shorter than the stigmatic portion. *Cypselas* monomorphic, thin, brown, concolorous; fruit body smooth or minutely tuberculate and barely to well-defined by longitudinal ridges associated with the vascular traces, glabrous; non-vascular longitudinal ridges absent; wing-like extensions not swollen and with entire or barely notched edges, the edges with biseriate, eglandular, curved or sometimes slightly inrolled hairs; carpodium present. *Pappus* of c. 10–15 scale-like, somewhat erect bristles which are connate or barely so at the base, the bristles to c. 0.4 mm long. *Chromosome number:*  $x = 9$ .

A ditypic genus found in south-eastern, mainland Australia and Tasmania. Both species of *Allittia* have laterally compressed, thin cypselas, which is characteristic of a number of other species in *Brachyscome* s.lat., but they differ from them by having long,

coarse, septate, brownish hairs at the base of the leaves. The fact that they are non-rhizomatous, tufted, perennial herbs also distinguishes them from other species of *Brachyscome* s.lat. with thin cypselas.

Immature fruit of *A. cardiocarpa* and sometimes mature fruit of *A. uliginosa* may exhibit two longitudinal ridges on each lateral face. Cleared fruit show that these ridges are associated with vascular traces in the pericarp and as such they are not considered to be homologous with the longitudinal ridges found in some other species of *Brachyscome* s.lat.

**Key to species of *Allittia***

1. Leaves usually entire, to 30 cm long, 0.1–0.4 cm wide, rarely with several linear lobes ..... **1. *A. cardiocarpa***
- 1: Leaves entire or pinnatisect, the latter common and with 1–6 lobes, all leaves to c. 11 cm long, (0.2) 0.4–1.4 cm wide ..... **2. *A. uliginosa***

For full descriptions and illustrations of the species see Short (2004).

**1. *Allittia cardiocarpa* (F.Muell. ex Benth.) P.S.Short**

Muelleria 20: 55, Fig. 1 a–g (2004). — *Brachyscome cardiocarpa* F.Muell. ex Benth., Flora Austral. 3: 517 (1867) (“*Brachycome*”); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 195, Fig. 55, 66, pl. vi, map 21 (1948) (“*Brachycome*”); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1448, Fig. 654E (1986) (“*Brachycome*”); J.Everett in G.J.Harden, Fl. New South Wales 3: 165 (1992) (“*Brachycome*”); E.Salkin et al., Austral. Brachyscomes 62 (1995); P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 842, Fig. 170a (1999). — **Lectotype:** Portland, W. Allitt 5 (MEL 220866) (Short 2004, p. 55).

*Distribution.* South-eastern South Australia, much of Victoria, the extreme south-east of New South Wales, and Tasmania.

*Notes.* A transverse section of a single fruit of *P.S. Short* 3238 (MEL) (Fig. 9A), showed two vascular bundles in the pericarp and small-celled sclerenchymatous tissue

surrounding each of the bundles and extending slightly into the wing. The cells of the testa displayed u-shaped thickening.

## 2. *Allittia uliginosa* (G.L.R.Davis) P.S.Short

Muelleria 20: 57, Fig. 1h–i (2004). — *Brachyscome uliginosa* G.L.R.Davis, Proc. Linn. Soc. New South Wales 79: 203, Fig. 1–4 (1955) (“*Brachycome*”); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1458, Fig. 657F (1986) (“*Brachycome*”); E.Salkin et al., Austral. Brachyscomes 240 (1995); P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 842, Fig. 170b (1999). — **Holotype**: Heathland swamp at eastern foot of Black Range (near “The Pass”, 3 miles NE of Mt Byron Trig), western Grampians region, Vic., 2 Nov. 1948, J.H. Willis (MEL 220486 p.p.). **Isotypes**: MEL 220486 p.p.(excluding holo.), MEL 220487 p.p. (excl. St John specimen).

**Distribution**. Southern Victoria, extending west from the Dandenongs to areas such as the Brisbane Ranges, Mt Langi Ghiran, the Grampians, and beyond to south-eastern South Australia, including Kangaroo Island.

**Notes**. A transverse section of a single fruit of *A.C. Beauglehole* 19845 (MEL) showed 2 vascular bundles in the pericarp and small-celled sclerenchymatous tissue to surround each of the bundles and extend into about the lower third of the wing. The cells of the testa were evenly thickened.

## *Brachyscome* Cass.

Bull. Sci. Soc. Philom. Paris 1816: 199 (1816); Cass. in F.Cuvier, Dict. Sci. Nat. (ed. 2) 3 (Suppl.): 64 (1817); 5 (Suppl.): 19, 63–64 (1817); 37: 464, 491–492 (1825) (the last as “*Brachycome*”). — *Bellis* sect. *Brachyscome* (Cass.) Baillon, Hist. Pl. 8: 114 (Jan.–Feb. 1882) (“*Brachycome*”). — **Type**: *B. billardierei* Cass. in F.Cuvier, Dict. Sci. Nat. 5 (Suppl.): 64 (1817) (“*billardieri*”), nom. illeg. = *B. aculeata* (Labill.) Cass. ex Lessing, Syn. Gen. Compos. 192 (1832); basionym: *Bellis aculeata* Labill., Nov. Holl. Pl. 2: 55, t. 206 (1806).

*Paquerina* Cass. in F.Cuvier, Dict. Sci. Nat. 37: 464, 492 (1825); Sond., Linnaea 25: 478 (1853) (“*Pacquerina*”). — *Brachyscome* sect. *Paquerina* (Cass.) Benth., Fl. Austral. 3: 509 (1867) (“*Brachycome*”); Benth. & Hook.f., Gen. Pl. 2: 264 (1873). — *Bellis* sect. *Paquerina* (Cass.) Kuntze in T.Post & Kuntze, Lex. Gen. Phan., Prosp. 164 (1903). — **Type**: *P. graminea* (Labill.) Cass. ex Less., Syn. Gen. Compos. 193 (1832); basionym: *Bellis graminea* Labill., Nov. Holl. Pl. 2: 54, t. 204 (1806).

*Brachystephium* Less., Syn. Gen. Compos. 388 (1832). — *Brachyscome* sect. *Brachystephium* (Less.) Benth., Fl. Austral. 3: 509 (1867) (“*Brachycome*”); Benth. & Hook.f., Gen. Pl. 2: 264 (1873). — *Bellis* sect. *Brachystephium* (Less.) Kuntze in T.Post & Kuntze, Lex. Gen. Phan., Prosp. 164 (Dec. 1903). — **Type**: *Brachystephium leucanthemoides* Less., Syn. Gen. Compos. 389 (1832), nom. illeg. = *Brachyscome diversifolia* (Graham ex Hook.) Fisch. & C.Meyer.

*Steiroglossa* DC., Prodr. 6: 38 (1838). — **Lectotype (here designated)**: *S. rigidula* DC., Prodr. 6: 39 (1838).

Candolle (1838) recognised four species, i.e. *S. chamomillaefolia* DC., *S. rigidula* DC., *S. humilis* DC. and *S. lineariloba* DC. As *S. humilis* DC. and *S. lineariloba* DC. were placed in a different, unnamed section with

the comment “An genus?” the lectotype should be the type of either *S. chamomillaefolia* DC. (referable to *B. iberidifolia*) or *S. rigidula* DC. (i.e. *B. rigidula*), with the latter here designated.

*Silphiosperma* Steetz in Lehm., Pl. Preiss. 1: 433 (1845). — *Brachyscome* sect. *Silphiosperma* (Steetz) Benth., Fl. Austral. 3: 510 (1867) (“*Brachycome*”). — *Ctenosperma* F.Muell. ex Pfeiff., Nomencl. Bot. 1: 936 (1874), pro syn., nom. inval, nom. illeg. (non *Ctenosperma* Hook.f.). — *Bellis* sect. *Silphiosperma* (Steetz) Kuntze in Post & Kuntze, Lex. Gen. Phan., Prosp. 164 (1903). — **Lectotype (here designated)**: *S. glandulosum* Steetz in Lehm., Pl. Preiss. 1: 433 (1845).

*Brachyscome* subg. *Metabrachyscome* G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 148, 151, 208 (1948) (“*Brachycome* subg. *Metabrachycome*”), nom. inval. Not accompanied by Latin description or diagnosis. Note that this means that the name *Brachyscome* subg. *Brachyscome* G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 148, 152 (1948) (“*Brachycome* subg. *Eubrachycome*”) was also not established.

*Brachyscome* sect. *Caulescentes* Hook.f., Fl. Tasman. 1: 186 (1856) (“*Brachycome*”), p.p. — **Type**: not designated. Rank indicated by “§”, the common method used by Hooker to designate a section and as such is acceptable under Art. 35.4. The description is brief: “Stems elongate, flexuose, terminating in naked, one-headed peduncles.” Hooker included: *B. angustifolia*, *B. stricta*, *B. oblongifolia*, *B. diversifolia*, *B. ciliaris*.

*Brachyscome* sect. *Scaposae* Hook.f., Fl. Tasman. 1: 184 (1856) (“*Brachycome*”), p.p. — **Type**: not designated. Rank indicated by “§”, the normal method used by Hooker to designate a section and as such is acceptable under Art. 35.4. The description is brief: “Leaves all radical. Capitula on scapes.” Hooker included: *B. decipiens*, *B. linearifolia*, *B. parvula*, *B. pumila*, *B. radicans*, *B. scapiformis*, *B. tenuiscapa*.

*Bellis* L., Sp. Pl. 886 (1753), p.p., as to *B. aculeata* Labill., *B. ciliaris* Labill., *B. graminea* Labill.

*Pyrethrum* Zinn., Cat. 414 (“*Pyrethum*”), [452] (1757), p.p., as to *P. diversifolium* Hook. (= *Brachyscome diversifolia*).

**Etymology**. There has been much discussion concerning the spelling of the generic name; should it be *Brachyscome* as originally used by Cassini, or *Brachycome*, as he subsequently amended it, the latter being grammatically correct. Adolphi et al. (1989) put forward a proposal to conserve the name *Brachycome* Cass., this being the second time that conservation was to be formally considered by the appropriate nomenclatural committee. In presenting the case they gave balanced arguments for and against conservation and referred to the earlier attempt to conserve the name, an attempt generally lacking in documentation except for the published vote (Subcommittee for Phanerogamae 1954). Unfortunately, in the first attempt there was no associated discussion when the results of the vote were published – 1 in favour of conservation, 3 against conservation, 5 against (as deemed to be unnecessary), and 1 abstention – leaving the outcome open to question. Was it rejected in order to retain the original spelling or because one could make a permissible orthographic correction, making conservation unnec-

essary? It transpired that voting by the Committee for Spermatophyta on the proposal by Adolphi et al. to conserve the spelling *Brachycome* resulted in a tied vote (6 for and 6 against conservation), prompting comment that “The present proposal was made in order to get a clear ruling, but again the necessary 8 votes in favour have not been obtained. The Committee does not recommend acceptance of the proposal. Although technically the vote

is indecisive and the issue may still be argued, it appears now that the [original] spelling *Brachyscome* should be preferred” (Brummitt 1993). Since Brummitt’s report it has become apparent that taxonomists (e.g. Brouillet et al. 2009; Flann et al. 2010; Barbhuiya 2014), at least one of whom would have preferred conservation of the spelling *Brachycome*, have followed the committee’s suggestion, a practice which I hope will continue.

### Key to species and species groups of *Brachyscome*

*Note.* Not having satisfactorily sorted some of the taxa, it has been difficult for me to construct a key with which I have complete confidence, albeit that this deficiency mainly applies to members of the largely apomictic *B. ciliaris* group. For that group the key will be found wanting as it does not cover all of the various entities, which I have referred to the *B. ciliaris* complex, but which have monomorphic and not (as is commonly encountered) dimorphic fruit. However, such entities are almost certainly pollen sterile and lack or have poorly developed terminal anther appendages, which places them in that complex. Rarely encountered specimens with dimorphic fruit but which are otherwise referable to *B. rigidula* sensu Davis will key to the *B. ciliaris* complex.

To assist in identification any illustrations included in this paper are cross referenced where a species is keyed out; for example, in the first couplet *B. decipiens* is keyed out based on features of the involucre bracts, but the illustrations (Fig. 2F, 10A, B) referred to are of cypselas. A list of all taxa and informal groups is provided in Table 1.

1. Involucre bracts in 2 distinct rows, the outer row obviously shorter than the inner (Fig. 2F, 10A, B) [*B. decipiens* group, pp. 80–82] ..... 28. *B. decipiens*
- 1: Involucre bracts appearing to be in 1 or c. 2 rows of about equal length or inner bracts shorter than the outer
  2. Cypselas with one or two swollen ridges on each lateral face, the ridges usually entirely swollen, but sometimes only apically swollen and if so the fruit brown or black, never grey or grey-purple; plants never rhizomatous or stoloniferous
  3. Lateral faces of cypselas each with a single, entirely or variably swollen, longitudinal ridge which may be wing-like, the ridge entire or variously divided (toothed); leaf lobes usually oblong-linear or subterete [*B. lineariloba* group, pp. 105–119; spp. 44–50]
  4. Cypselas curved, at least apically manifestly bent
    5. Lateral margins of cypselas with basal tufts of hairs (Fig. 4E, F) ..... 49. *B. smithwhitei*
    - 5: Lateral margins of cypselas without discrete basal tufts of hairs
      6. Lateral margins of cypselas somewhat swollen and slightly dilating towards the apex, usually entire and with or without several transverse ridges in c. the lower half, rarely with 1 or 2 very shallow teeth (Fig. 4C, D, 10H, 11A) ..... 47. *B. eriogona*
      - 6: Lateral margins of cypselas with prominently lobed wings
        7. Divided leaves with (3) 4–9 often irregular (not strictly paired) lateral lobes; cypselas with the upper part of the lateral wing usually gradually curved (central & northern S.A., south-western Qld) (Fig. 4A, B, 10G) ..... 45. *B. campylocarpa*
        - 7: Divided leaves with 3–5 often irregular (not strictly paired) lateral lobes; cypselas with the upper part of the lateral wing abruptly curved (south-eastern Qld, northern N.S.W.) (Fig. 4G, H, 37) ..... 50. *B. watanabei*
  - 4: Cypselas straight
    8. Ray corollas 6–14 mm long, mostly more than 7 mm long; anthers c. 1–1.5 mm long; pollen grains c. 4,000–8,500 per floret; major branches mostly erect (Fig. 36) ..... 46. *B. dichromosomatica*
    - 8: Ray corollas 0.8–7.2 mm long, mostly less than 5.5 mm long; anthers c. 0.35–0.75 mm long; pollen grains c. 120–1,000 per floret; major branches mostly decumbent or ascending
      9. Flowering branches mostly less than 2 cm long, the first-formed less than 1 cm long at maturity and all branches usually shorter than the leaves; ray corollas 0.8–2.8 mm long (Fig. 35) ..... 44. *B. breviscapis*
      - 9: Flowering branches mostly more than 2 cm long, the first-formed more than 1 cm long and branches mostly, if not always, longer than the leaves; ray corollas 1.8–7.2 mm long (Fig. 3K, 35) ..... 48. *B. lineariloba*
- 3: Lateral faces of cypselas each with inversely u-shaped ridges, often the faces tuberculate, if the 2 ridges not obvious then the leaf lobes not oblong-linear or subterete and the cauline leaves manifestly dilated in c. the lower ¼–½
10. Cypselas with ab/adaxial wing-like margins (Fig. 7E, F, 52, 54) [*B. whitei* group, pp. 165–168] ..... 87. *B. whitei*
- 10: Cypselas lacking ab/adaxial wing-like extensions [*Brachystephium* group, pp. 46–57; spp. 9–15]
  11. Ray corolla less than 3 mm long; cypselas dark brown to black; disc corollas commonly 4-lobed (Fig. 1H, 17) ..... 11. *B. goniocarpa*
  - 11: Ray corolla more than 4 mm long; cypselas brown, reddish-brown, dark green or black; disc corollas commonly 5-lobed

12. Outermost cypselas with a prominent crest, at least the lateral faces of the cypselas with prominent tubercles ..... 13. *B. nodosa*
- 12: Outermost fruit lacking a prominent crest, lateral faces with or without tubercles
13. Leaves mostly entire and somewhat linear or mostly 1-pinnatisect or a mixture of entire and divided leaves; cypselas straight, the pappus centrally placed and the bristles spreading ..... 14. *B. readeri*
- 13: Leaves never mostly entire, always mostly lobed to deeply divided (to 2-pinnatisect or rarely 3-pinnatilobed/pinnatisect); cypselas barely straight to distinctly curved, the pappus usually appearing off-centre and the bristles somewhat spreading or erect
14. Leaves mostly 1-pinnatisect and the resulting lobes usually with 3 (–5) apical teeth or short lobes, basally not manifestly dilated; plants glabrous or almost so, scrambling; involucre bracts 4.5–7 mm long (Lord Howe Island) ..... 15. *B. segmentosa*
- 14: Leaves variably divided and sometimes mostly 1-pinnatisect and toothed or lobed as above but at least some leaves on the plants manifestly dilating towards the base; plants glabrous to extremely hairy, usually erect and not scrambling or if at all so then the involucre bracts 6.5–10.5 mm long (eastern mainland, Bass Strait islands and Tasmania)
15. Largest involucre bracts more than 6 mm long, outer surfaces with stalked glandular and/or septate eglandular hairs; cypselas almost straight or slightly curved (Fig. 1G) .. 10. *B. diversifolia*
- 15: Largest involucre bracts less than 5 mm long, outer surfaces glabrous or with a scattered or dense indumentum of stalked glandular hairs; cypselas distinctly curved
16. Cypselas 1.1–2.2 mm long, red-brown or black; apically the longitudinal ridges usually broadening to form prominent shoulders (Fig. 1I) ..... 12. *B. gracilis*
- 16: Cypselas 2.2–2.7 mm long, pale yellow-brown; apically the two longitudinal ridges on each surface often indistinct, appearing as one, and not forming prominent shoulders (Fig. 1F, 16) ..... 9. *B. cassiana*
- 2: Cypselas with or without longitudinal ridges, but if present, then the ridges not swollen (but grey or grey-purple fruit may appear to be apically swollen), often the entire cypselas manifestly flattened; plants may be rhizomatous or stoloniferous
17. Pappus an entire ring [*B. basaltica* group, pp. 41–46; spp. 6–8]
18. Annual herb (Cooper River drainage basin) (Fig. 1E) ..... 8. *B. rara*
- 18: Perennial, stoloniferous herbs
19. Leaves entire or rarely with several teeth, narrowly elliptic, obovate to oblanceolate, 10–14 mm wide; cypselas distinctly swollen, manifestly tuberculate throughout and ridges not apparent on the lateral surfaces (Fig. 1C) ..... 6. *B. basaltica*
- 19: Leaves entire, somewhat linear or narrowly elliptic, 0.7–5 mm wide; cypselas not distinctly swollen but flattish, tubercles present and often many but longitudinal ridges usually distinct on both lateral surfaces (Fig. 1D, 15) ..... 7. *B. paludicola*
- 17: Pappus absent, or a jagged crown
20. Cypselas with sometimes the uppermost part glabrous but otherwise manifestly hairy, with the hairs straight and obscuring the surface of the fruit [*B. iberidifolia* group, pp. 92–105; spp. 36–43]
21. Pappus present (Fig. 3J, 32) ..... 43. *B. simulans*
- 21: Pappus absent
22. Stalked glandular hairs on branches and leaves mostly sparsely distributed, less than c. 0.04 mm long (Murchison River to Shark Bay region, W.A.) (Fig. 28) ..... 37. *B. billabongensis*
- 22: Stalked glandular hairs on branches and leaves sparse to conspicuous, the hairs c. 0.06–0.1 mm long (N.T., S.A., Qld) (Fig. 3I, 31) ..... 40. *B. gilesii*
- 20: Cypselas not or sparsely hairy, if with many hairs then the majority of the fruit surface clearly visible and hairs rarely straight
23. Ray corolla yellow (at least in bud) or if white then either the majority of mature leaves terminally 3-lobed or the cypselas with strongly curved ab/adaxial wings and lacking longitudinal ridges on the lateral faces [*B. dentata* group, pp. 82–92; spp. 29–35]
24. Expanded ray corolla yellow when fresh (Fig. 2G, H, 26) ..... 29. *B. chrysoglossa*
- 24: Expanded ray corolla white or mostly white when fresh, may dry yellow
25. Cypselas strongly curved
26. Cypselas with a central longitudinal wing developed on each lateral face (Fig. 3C, 29) 35. *B. tetrapterocarpa*
- 26: Cypselas lacking longitudinal wings on lateral faces
27. Cypselas with the central part of the inner lateral surface manifestly tuberculate (Fig. 2I, 10C, D) ..... 30. *B. curvicaarpa*
- 27: Cypselas with the inner lateral surface smooth (Fig. 3A, 27) ..... 33. *B. georginensis*
- 25: Cypselas flat or almost so
28. Annual; leaves with long, coarse, eglandular, whitish, septate hairs; cypselas with or without wing-like margins (Fig. 2J, K) ..... 31. *B. debilis*
- 28: Perennial or annual; leaves if with eglandular hairs then the hairs cottony (but may have coarse bases); cypselas always with wing-like margins
29. Cypselas margins dissected; body of fruit covered with somewhat conical tubercles, rarely at all scale-like (Fig. 2L) ..... 32. *B. dentata*
- 29: Cypselas margins mostly entire; body of fruit densely covered with rows of flat, scale-like tubercles (Fig. 3B, 10E) ..... 34. *B. papillosa*

- 23: Ray corolla not yellow but white, bluish or pinkish; terminally 3-lobed leaves absent or in the minority; cypselas lacking strongly curved ab/adaxial wings or if they are present then the lateral faces with longitudinal ridges
- 30: Cypselas manifestly compressed and with wing-like margins, uniformly coloured or colour gradually changing, lateral faces lacking longitudinal ridges, monomorphic; anthers each with several hundred fertile pollen grains and with a well-developed terminal appendage [*B. aculeata* group, pp. 34–41; spp. 1–5]
- 31: Leaves mostly basal and persistent
- 32: Ray corolla white above; bracts rounded or somewhat acute, outer surfaces glabrous (Fig. 13) ..... 3. *B. cuneifolia*
- 32: Ray corolla usually mauve or blue; bracts acute to acuminate, outer surfaces with hairs (Fig. 14) ..... 5. *B. spatulata*
- 31: Leaves mostly cauline, basal ones usually not persistent
- 33: Ray corolla blue; cypselas apically truncate or almost so ..... 2. *B. ascendens*
- 33: Ray corolla white or white above and bluish beneath; cypselas with an apical notch
- 34: Cypselas with the wing-like margins entire or irregularly dissected; indumentum below involucre of coarse (broad-based and sometimes somewhat conical) glandular hairs (Fig. 1A, 9B) ..... 1. *B. aculeata*
- 34: Cypselas with the wing-like margins deeply dissected; indumentum below involucre of fine glandular hairs (Fig. 1B) ..... 4. *B. riparia*
- 30: Cypselas variously shaped and coloured and sometimes dimorphic, if compressed and with wing-like margins then the cypselas discoloured (e.g. fruit body brown, wing-like margins yellowish) or with longitudinal ridges or anthers with sterile pollen or fewer than 100 pollen grains (*B. glandulosa* & *B. perpusilla*) or the terminal anther appendage absent or poorly developed
- 35: Cypselas both flat and thin, with longitudinal ridges and with ab/adaxial wings, plants stoloniferous and scapiform (in alpine habitats above tree-line) or cypselas as stated but the wings inflated and plants creeping (in non-alpine marshy habitats) (N.B.: includes alpine *B. stolonifera* but its cypselas tending to have swollen lateral surfaces and both longitudinal ridges and ab/adaxial wings barely developed or absent, its cypselas with elongate, biseriate, septate glandular hairs 0.05–0.2 mm long over much of their surface) [*B. nivalis* group, pp. 141–149; spp. 63–68]
- 36: Ab/adaxial margins of cypselas an inflated wing (Fig. 6C, D) ..... 65. *B. radicans*
- 36: Ab/adaxial margins of cypselas a thin wing
- 37: Leaves entire or mostly so
- 38: Peduncles with stalked glandular hairs (Fig. 6A, 46) ..... 63. *B. barkerae*
- 38: Peduncles glabrous
- 39: Peduncles 1–7 cm long, ebracteate or with a single (?) bract(s); cypselas not or barely winged ..... 66. *B. stolonifera*
- 39: Peduncles 7–22 cm long, usually with more than one bract (up to 7); wings of cypselas 0.5–0.7 mm wide ..... 67. *B. tadgellii*
- 37: Leaves all or mostly toothed or lobed
- 40: Peduncles glabrous (Fig. 6B, 11E, 48) ..... 64. *B. nivalis*
- 40: Peduncles with stalked glandular hairs (Fig. 6E, 47) ..... 68. *B. walshii*
- 35: Cypselas not both flat and thin, lacking longitudinal ridges and ab/adaxial wings, or if with longitudinal ridges and ab/adaxial wings then wings not inflated and plants non-alpine (but may occur in temperate upland forests)
- 41: Annual herbs; cypselas ovoid, subovoid or club-shaped, often greyish or with shades of purple-black but never manifestly discoloured, lateral faces commonly concave, lacking both longitudinal ridges and wings or wing-like margins [*B. iberidifolia* group, pp. 92–105; spp. 36–43]
- 42: Ray corolla less than c. 3 mm long; anthers less than c. 0.5 mm long ..... 39. *B. eyrensis*
- 42: Ray corolla more than c. 4 mm long; anthers more than c. 0.6 mm long
- 43: Cypselas lacking eglandular hairs, the lateral surfaces manifestly grey-tessellated throughout (Fig. 3D) ..... 36. *B. bellidioides*
- 43: Cypselas with eglandular hairs, the lateral surfaces never tessellated, but may be minutely grey-papillate
- 44: Eglandular hairs on cypselas straight or curved, not apically-curved or if appearing so then at least the mid- to upper cauline leaves subamplexicaul (Fig. 3E–G, 30) ..... 38. *B. exilis*
- 44: Eglandular hairs on cypselas apically-curved
- 45: Glabrous or glandular hairy herbs with leaves not mostly linear and undivided or if so either the leaves not mostly basal and near-basal and the plants more than c. 15 cm tall or many near basal leaves variously toothed or lobed (Fig. 3H, 10F, 33, 34) ..... 41. *B. iberidifolia*\*
- 45: Glabrous herbs with mostly basal, sublinear and linear leaves which are rarely toothed ..... 42. *B. pusilla*

\*Some specimens from the eastern States will key out here, but all non-W.A. specimens that do so are treated under *B. exilis* s.lat.

- 41: Perennial or annual herbs, if annual then the cypselas with wings or wing-like margins or the cypselas black or discolourous and/or prominently tuberculate
- 46: Cypselas with prominently curved wings or wing-like ab/adaxial margins and with longitudinal ridges on the lateral faces [*B. muelleri* group, pp. 119–123; spp. 51–53]
- 47: Pappus absent; leaves mostly 1-pinnatisect, 25–85 mm long, with 4–12 (17) opposite to irregularly spaced somewhat curving ovate to triangular teeth or lobes (South Australia) (Fig. 4I) ..... 51. *B. muelleri*
- 47: Pappus present, of spreading bristles 0.1–0.2 mm long; leaves mostly entire or if 1-pinnatisect the lobes narrowly elliptic or linear (New South Wales and Victoria)
- 48: Leaves entire or mostly so, sometimes a few with several short, linear, irregularly placed lobes; cypselas more or less uniformly brown throughout, the wings strongly curved (Fig. 4J, 11B) ..... 52. *B. muelleroides*
- 48: Leaves in at least large plants with mostly pinnatisect leaves with 4–11 narrowly elliptic or linear lobes; cypselas discolourous, body dark brown, wings almost flat to manifestly curved and yellow-brown (Fig. 4K, 39) ..... 53. *B. ptychocarpa*
- 46: Cypselas lacking curved wings or wing-like margins or if present then the lateral faces lacking longitudinal ridges
- 49: Cypselas lacking eglandular hairs or with a few straight hairs; cypselas concolorous and lacking longitudinal ridges [*Paquerina* group, pp. 149–162; spp. 69–76]
- 50: Most or all leaves entire
- 51: Cypselas somewhat inflated, particularly on the margins and with conspicuous glandular hairs and commonly sticky (eastern mainland Australia and Tasmania) (Fig. 6G, 11H) ..... 70. *B. graminea*
- 51: Cypselas neither inflated or sticky
- 52: Leaves 10–56 mm long, 0.25–3.7 mm wide, glabrous or with a few coarse, white, septate eglandular hairs and stalked glandular hairs; cypselas 1.4–1.7 mm long, 0.6–0.85 mm wide (Tasmania) (Fig. 5I) ..... 75. *B. tasmanica*
- 52: Leaves 25–250 mm long, 1–4 (14) mm wide, glabrous or with a few glandular hairs only; cypselas 1.7–2.9 mm long, 0.9–1.6 mm wide (mainland only)
- 53: Leaves linear or linear-oblongate, 1–2.5 mm wide; scapes each with (2) 3–9 leaf-like bracts; pappus a crown of scale-like bristles 0.1–0.3 mm long; remains of old leaves usually not retained at base of plant (Fig. 6H) ..... 71. *B. obovata*
- 53: Leaves oblanceolate or subspathulate, largest leaves 4–12 mm wide; scapes each usually with 0–3 leaf-like bracts, rarely more; pappus a crown of scale-like bristles barely 0.1 mm high; remains of old leaves retained at base of plant (Fig. 12A, B) ..... 73. *B. scapigera*
- 50: Most or all of the largest leaves at least partly toothed or lobed (smaller upper leaves on scapes may be entire)
- 54: Cypselas with their apices and margins beset with many shortly-stalked glandular hairs (Tasmania) (Fig. 6I) ..... 72. *B. radicata*
- 54: Cypselas lacking conspicuous glandular hairs on their apices and margins (Tasmania or eastern mainland Australia)
- 55: Cypselas brown or purplish brown at maturity (Tasmania) ..... 76. *B. tenuiscapa*
- 55: Cypselas blackish at maturity (mainland Australia)
- 56: Scapes with 3–16 oblanceolate, entire or pinnatilobed leaves (Fig. 6F, 11F, G, 49) ..... 69. *B. foliosa*
- 56: Scapes with or without 1 or 2 entire, linear leaves (Fig. 50) ..... 74. *B. staceae*
- 49: Cypselas with curved or apically-curved eglandular hairs, if straight and apically bifid then the cypselas with longitudinal ridges; cypselas concolorous or discolourous
- 57: Mature cypselas commonly black or sometimes very dark brown, concolorous; lateral faces manifestly tuberculate and lacking longitudinal ridges or if ridges present then plants only with leaves in a basal tuft; cypselas never dimorphic [*B. multifida* group, pp. 123–141; spp. 54–62]
- 58: Perennials with a tufted mode of growth, all leaves basal; cypselas winged or unwinged, with longitudinal ridges
- 59: Cypselas with a distinct wing with eglandular, straight to apically curling hairs along their length; pappus distinct; leaves entire or 1-pinnatifid; bracts frequently with purplish apices and margins; at least sometimes the apical appendages of the anthers not or poorly developed and less than c. 0.1 mm long and the style appendages c. 0.5 mm long (Fig. 5C) ..... 55. *B. dissectifolia*
- 59: Cypselas unwinged or nearly so, ab/adaxial margins smooth or with several barely formed tubercles, glabrous or with occasional short hairs; pappus usually very short; leaves mostly 1- or 2-pinnatifid; bracts usually with whitish apices and margins; apical appendages of the anthers seemingly always prominent and c. 0.3 mm long and the style appendages c. 0.25 mm and apically somewhat blunt (Fig. 5A) ..... 60. *B. stuartii*

- 58: Annual or perennial herbs or subshrubs, leaves basal and cauline; cypselas unwinged, with or (usually) without longitudinal ridges
- 60: Cypselas with longitudinal ridges; annual, glandular hairy herb (Fig. 5D, 42) . . . . . 57. *B. microcarpa*
- 60: Cypselas lacking longitudinal ridges; annual or perennial herbs or subshrubs with or without stalked glandular hairs
- 61: Perennial herb or subshrub with somewhat woody base, mostly glabrous or with only glandular hairs; leaves linear and entire or with linear lobes or the lamina wide and variously dissected, being 1- or 2-pinnatifid; bract surface glabrous, glandular hairs restricted to margins (Fig. 5F, 11D) . . . . . 58. *B. multifida*
- 61: Perennial or annual herbs, never a woody-based subshrub, hairs glandular or eglandular, leaves variously dissected but the teeth or lobes rarely extending more than c. ½ way to the midrib and only rarely with secondary teeth, the lobes never linear or leaves deeply divided and mostly trisect; bract surfaces glabrous or more commonly with a scattered to dense indumentum of hairs
- 62: Herb with a general indumentum of septate, uniseriate eglandular hairs to 0.6 mm long and stalked glandular hairs; pappus readily discernable, individual elements c. 0.1–1.1 mm long (arid and semiarid regions, commonly on clay-dominated soils on floodplains) (Fig. 5I, 11C, 40, 41) . . . . . 56. *B. melanocarpa*
- 62: Herbs with a scattered to dense general indumentum of stalked glandular hairs, eglandular septate hairs absent or if appearing to be present then in a mix of hairs of manifestly different lengths; pappus elements less than 0.1 mm long and/or uppermost leaves opposite
- 63: Leaves mainly of 3, rarely 5, primary lobes terminating petiole-like stalks c. 5–30 mm long, primary lobes 2.5–12 mm long, 1.5–16 mm wide, formed by divisions extending to about the midrib, major lobes in turn trisect and these often 3-toothed (Fig. 5E, 45) . . . . . 62. *B. trisecta*
- 63: Leaves not as above
- 64: Uppermost leaves paired (Fig. 5D, 24) . . . . . 57. *B. microcarpa*
- 64: Uppermost leaves alternate
- 65: Pappus a crown, individual elements 0.2–0.4 mm long; bracts with or without scattered hairs (branches weakly ascending, leaves thin and not rigid; south-eastern N.S.W.) (Fig. 5B, 38) . . . . . 54. *B. abercrombiensis*
- 65: Pappus absent or at least a very short crown, the elements less than 0.1 mm long; bracts often with numerous hairs (branches and leaves comparatively rigid; north-eastern N.S.W. and south-eastern Qld)
- 66: General indumentum occasionally sparse but mostly dense, the stalked glandular hairs c. 0.06–0.88 mm long, the hairs barely to manifestly tapering to their minute glandular tip, sometimes the longest hairs possibly eglandular, usually the hairs in an obvious mix of lengths and with the longest hairs often conspicuously longer than the rest; cypselas not somewhat swollen, eglandular biseriate hairs absent or scattered and seemingly straight and c. 0.05 mm long (Fig. 5H) . . . . . 59. *B. nova-anglica*
- 66: General indumentum of shortly stalked glandular hairs 0.04–0.12 mm long but grading in length; cypselas somewhat swollen, eglandular biseriate hairs c. 0.05–0.08 mm long and apically-curved (Fig. 5G, 43, 44) . . . . . 61. *B. tamworthensis*
- 57: Mature cypselas shades of brown and commonly pale brown, sometimes markedly discoloured; lateral faces with or without tubercles, longitudinal ridges present or absent; cypselas sometimes dimorphic
- 67: Cypselas mono- or dimorphic, lacking longitudinal ridges on the lateral faces or if present a shrubby central Australian species (*B. tesquorum*) and the major branches with corky base; terminal anther appendages distinct in some species but absent or poorly developed in others [*B. ciliaris* group, pp. 57–80; spp. 16–27]
- 68: Annual herb with an indumentum of mostly scattered eglandular, whitish, biseriate, septate hairs with a manifestly rounded bifid apex (Eyre Peninsula, S.A.) (Fig. 2E) . . . . . 27. *B. xanthocarpa*
- 68: Annual or perennial herbs or subshrubs, glabrous or variously hairy but eglandular hairs never with a rounded, bifid apex
- 69: Cypselas monomorphic
- 70: Cypselas manifestly flattened, thin and with wing-like extensions
- 71: Perennial herb or subshrub (Fig. 2A, 23) . . . . . 22. *B. rigidula*
- 71: Annual herb
- 72: Margins of cypselas entire and glabrous (Fig. 1L) . . . . . 19. *B. glandulosa*
- 72: Margins of cypselas shallowly to deeply notched and with eglandular hairs (Fig. 1M, 9D, E) . . . . . 21. *B. perpusilla*

- 70: Cypselas, somewhat flattened but never with wing-like extensions but the ab/adaxial margins may be thick and pronounced and often paler than the fruit body
- 73: Subshrub with near prostrate or decumbent branches; leaves semi-succulent, obovate or spatulate, 5–22 mm wide, entire or with 1–3 mostly shallow and apically obtuse lobes in about the upper half of the leaf (limestone cliffs of the Great Australian Bight) (Fig. 9F, 24, 25) . . . . . 24. *B. tatei*
- 73: Herbs or subshrubs with ascending to erect branches and lacking the above combination of features
- 74: Cypselas with their lateral surfaces tuberculate
- 75: Anthers lacking apical appendages; branches stiff, leaves rigid and mostly linear or linear-oblongate, entire and less than 3 mm wide (arid regions of Australia between c. 29° and 35° S) (Fig. 2D, 9G) 26. *B. trachycarpa*
- 75: Anthers with well-developed apical appendages; branches often corky at base, leaves entire or 1- or 2-pinnatifid (central Australia)
- 76: Leaves 1- or 2-pinnatifid, lobes numerous and often small, but some may be somewhat linear, acute; cypselas lacking longitudinal ridges but the ab/adaxial margins broad and thick . . . . . 16. *B. blackii*
- 76: Leaves entire or with usually few lobes and these mostly distant, fine (often somewhat linear) and apically acute; cypselas with 2 longitudinal ridges on each lateral surface . . . . . 25. *B. tesquorum*
- 74: Cypselas with their lateral surfaces non-tuberculate (but eglandular hairs may be conspicuous)
- 77: Cypselas 1.15–1.3 mm long, beset with hairs c. 0.04–0.12 mm long (southern Queensland and northern New South Wales) (Fig. 1J, 2I) 18. *B. dalbyensis*
- 77: Cypselas 1.4–2.1 mm long, with few hairs (south-eastern mainland and Tasmania) (Fig. 1K) . . . . . 20. *B. parvula*
- 69: Cypselas dimorphic
- 78: Perennial; leaves mostly entire, linear oblanceolate or linear; stalked glandular hairs on leaves distinctly triangular and multiserial at their base (Rudall River area, W.A.) (Fig. 2B, C, 22) . . . . . 23. *B. rudallensis*
- 78: Annual or perennial herbs or subshrubs; leaves not mostly entire or with glandular hairs as above (Fig. 18–20) . . . . . 17. *B. ciliaris*
- 67: Cypselas monomorphic, with longitudinal ridges on the lateral faces; terminal anther appendages present [*B. triloba* group, pp. 162–165; spp. 77–86]
- 79: Largest lower and mid-cauline leaves not tapering towards a petiole-like base but manifestly sessile and often subamplexicaul, their apices usually truncate and 3-dentate, the teeth small and of about equal size, the leaves usually otherwise entire but sometimes 1 or both margins with 1 or 2 additional narrow lateral teeth or lobes present . . . . . 80. *B. mittagongensis*
- 79: Largest lower and mid-cauline leaves commonly tapering basally and forming a petiole-like base; if not forming a petiole-like base then their apices not both truncate and 3-dentate although they may be apically 3-lobed, but if 3-lobed then either additional marginal lobes present on at least some leaves or most leaves entire
- 80: Basal and cauline leaves mostly entire, sublinear to linear-oblongate or linear-spatulate and frequently and markedly contracting to a petiole like base, rarely 1–several leaves with 1–5 lobes; ab/adaxial margins of cypselas with narrow but definite wings 0.1–0.4 mm wide . . . . . 85. *B. triloba*
- 80: Basal to mid-cauline leaves all, or mostly all, with teeth or lobes, or if most or all basal and mid-cauline leaves entire (at least as in some plants of *B. kaputarensis*) the leaves somewhat linear or linear-oblongate and lacking a distinctive contraction to form a petiole-like base and the cypselas lacking ab/adaxial wings
- 81: Cypselas with the ab/adaxial margins bearing wings, the wings divided or entire and with eglandular hairs along their length
- 82: Cypselas body smooth or with inconspicuous tubercles, brown or dark greenish brown or greenish black and darker than the wings, the longitudinal ridges on the lateral surfaces often poorly developed; cypselas wings 0.2–0.8 mm wide, entire or notched (Fig. 7B, 53) . . . . . 82. *B. procumbens*
- 82: Cypselas body with well-developed tubercles, yellow-brown or brown and apically sometimes purplish but not manifestly darker than the wings, the longitudinal ridges on the lateral surfaces distinct and sometimes flange-like; cypselas wings barely 0.1 mm wide or up to 0.5 mm wide
- 83: Leaves with 1–5, usually apically acute lobes, most often with only 3 apical lobes of which the terminal lobe is usually manifestly larger than the lateral lobes . . . . . 85. *B. triloba*



- 83: Leaves sometimes trifid but mostly with a total of 5–14 teeth or lobes (Fig. 7C) ..... 83. *B. salkiniae*
- 81: Cypselas with the ab/adaxial margins lacking wings but the margins may have tubercles (includes *B. willisii* in which the prominent tuberculate margins may be interpreted as wings)
- 84: Mid- to upper cauline leaves entire and somewhat linear or linear-oblongate or with 1–6 lateral lobes, the divisions extending more than ½ way and sometimes almost reaching the midrib and the terminal lobes somewhat linear; branches and leaves lacking eglandular hairs (Fig. 7A) ..... 79. *B. kaputarensis*
- 84: Mid- to upper cauline leaves shallowly lobed or at least the lobes never long and somewhat linear; branches and leaves with or without eglandular hairs
- 85: Leaves only sometimes with a petiole-like base, sometimes sub-amplexicaul, at least in the larger leaves the segments present along most of the length of the leaf (Victoria) (Fig. 12C) ..... 81. *B. petrophila*
- 85: Leaves commonly with a petiole-like base, lateral segments usually in the distal ½ of the leaf (but distal ¾ in *B. sieberi* from N.S.W.)
- 86: Whitish, septate eglandular hairs absent from branches and leaves
- 87: Stalked glandular hairs usually forming a prominent indumentum beneath the capitula; mid-cauline leaves entire or with 6 or fewer segments ..... 77. *B. brownii*
- 87: Stalked glandular hairs absent or only occasional throughout the plant; mid-cauline leaves with 5–19 segments ..... 78. *B. formosa*
- 86: Whitish, septate eglandular hairs on branches and leaves (may be sparse on mature parts)
- 88: Mid-cauline and upper leaves often apically 3-lobed but up to 9 marginal lobes formed from divisions extending to c. ½ the distance to the midrib, lobes entire and apically acute ..... 84. *B. sieberi*
- 88: Mid-cauline and upper leaves with 3–11 primary marginal lobes formed from divisions extending c. ¼ to ⅜ the distance to the midrib, the resultant lobes obtuse to acute and each often with 1 or 2 lateral teeth (Fig. 7D) ..... 86. *B. willisii*

### *Brachyscome aculeata* group

Perennial, stoloniferous (or mostly so) *herbs*. Leaves basal and cauline, broad, lobed. Ray corollas white or bluish. Terminal anther appendages present. Cypselas monomorphic, thin and with wing-like margins, longitudinal ridges absent, eglandular hairs biseriate and straight to curved. Chromosome number:  $x = 9$ .

*Distribution*. Eastern Australia, including Tasmania.

*Notes*. Davis (1948) adopted a very broad circumscription of the taxon she referred to as *B. aculeata*, recording that there are “no real discontinuities ... between ... populations” and that it is “undesirable and fulfils no useful purpose to perpetuate the confusion of terminology arising from the practice of giving each variation distinct status” (Davis 1948, p. 186). She relegated 11 names to synonymy under *B. aculeata*, despite not having seen type specimens of several of the names but listing them on the authority of Bentham (1867).

*Brachyscome aculeata* sensu G.L.R.Davis was subsequently shown to be chromosomally highly variable, exhibiting “a wealth of polyploidy”, “different geographical isolates at the diploid level” and “undoubtedly genetic differentiation between the diploid forms” (Smith-White et al. 1970, p. 115). Stace (1981) reported the results of self- and cross-pollination experiments between various entities and of further cytological studies of the members of what she called

the *B. aculeata* complex. She subsequently recognised segregate taxa, i.e. *B. aculeata*, *B. cuneifolia*, *B. spathulata* subsp. *spathulata*, *B. spathulata* subsp. *glabra* and *B. sieberi* var. *gunnii*.

Thanks to the detailed work of Stace at least some taxonomic problems have been resolved. Indeed, this treatment relies heavily on the application of her concepts. However, the morphological variation I have observed is such that I have elected not to recognise *B. sieberi* var. *gunni* but treat it as a synonym of *B. aculeata*, and nor have I maintained the two subspecies of *B. spathulata*. On the other hand, some collections mentioned below under *B. aculeata*, *B. spathulata* and *B. riparia*, are of entities which on further investigation may prove to be worthy of formal naming.

### 1. *Brachyscome aculeata* (Labill.) Cass. ex Less.

Syn. Gen. Comp. 192 (1832); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 183, Fig. 58, pl. vi, map 17, pl. x, 1 & 2 (1948) (“*Brachyscome*”), p.p., excluding *B. cuneifolia* & *B. spathulata*; J.H.Willis, Handb. Pl. Victoria 2: 675 (1973) (“*Brachyscome*”), p.p., excl. *B. cuneifolia* & *B. spathulata*; H.M.Stace, Austral. J. Bot. 29: 425–440 (1981); J.Everett, in G.J.Harden, Fl. New South Wales 3: 163 (1992) (“*Brachyscome*”); E.Salkin et al., Austral. Brachyscomes 34 (1995); P.S.Short, in N.G.Walsh & Entwisle, Fl. Victoria 4: 838, Fig. 169a (1999). — *Bellis aculeata* Labill., Nov. Holl. Pl. 2: 55, t. 206 (1806). — **Type citation**: “Habitat in terrâ Van-Leuwin.” **Lectotype**: New Holland, Labillardière (G-DC). (Davis 1948, pp. 183,

**Table 1.** List of taxa and informal groups within *Brachyscome* in Australia.

<b><i>Brachyscome aculeata</i> group</b>	
1. <i>B. aculeata</i> (Labill.) Cass. ex Less.	30. <i>B. curvica</i> G.L.R.Davis
2. <i>B. ascendens</i> G.L.R.Davis	31. <i>B. debilis</i> Sond.
3. <i>B. cuneifolia</i> Tate	32. <i>B. dentata</i> Gaudich.
4. <i>B. riparia</i> G.L.R.Davis	33. <i>B. georginensis</i> P.S.Short
5. <i>B. spathulata</i> Gaudich.	34. <i>B. papillosa</i> G.L.R.Davis
<b><i>Brachyscome basaltica</i> group</b>	35. <i>B. tetrapterocarpa</i> G.L.R.Davis
6. <i>B. basaltica</i> F.Muell.	<b><i>Brachyscome iberidifolia</i> group</b>
7. <i>B. paludicola</i> P.S.Short	36. <i>B. bellidioides</i> Steetz
8. <i>B. rara</i> G.L.R.Davis	37. <i>B. billabongensis</i> P.S.Short
<b><i>Brachystephium</i> group</b>	38. <i>B. exilis</i> Sond.
9. <i>B. castiana</i> P.S.Short	39. <i>B. cyrensis</i> G.L.R.Davis
10. <i>B. diversifolia</i> (Graham ex Hook.) Fischer & C.Meyer	40. <i>B. gilesii</i> P.S.Short
11. <i>B. goniocarpa</i> Sond. & F.Muell. ex Sond.	41. <i>B. iberidifolia</i> Benth.
12. <i>B. gracilis</i> G.L.R.Davis	42. <i>B. pusilla</i> Steetz
12a. subsp. <i>gracilis</i>	43. <i>B. simulans</i> P.S.Short
12b. subsp. <i>robusta</i> P.S.Short	<b><i>Brachyscome lineariloba</i> group</b>
13. <i>B. nodosa</i> P.S.Short & K.Watan.	44. <i>B. breviscapis</i> C.R.Carter
14. <i>B. readeri</i> G.L.R.Davis	45. <i>B. campylocarpa</i> J.M.Black
15. <i>B. segmentosa</i> C.Moore & F.Muell.	46. <i>B. dichromosomatica</i> C.R.Carter
<b><i>Brachyscome ciliaris</i> group</b>	46a. var. <i>dichromosomatica</i>
16. <i>B. blackii</i> G.L.R.Davis	46b. var. <i>alba</i> C.R.Carter
17. <i>B. ciliaris</i> (Labill.) Less.	47. <i>B. eriogona</i> (J.M.Black) G.L.R.Davis
18. <i>B. dalbyensis</i> P.S.Short	48. <i>B. lineariloba</i> (DC.) Druce
19. <i>B. glandulosa</i> (Steetz) Benth.	49. <i>B. smithwhitei</i> P.S.Short & K.Watan.
20. <i>B. parvula</i> Hook.f.	50. <i>B. watanabei</i> P.S.Short
21. <i>B. perpusilla</i> (Steetz) J.M.Black	<b><i>Brachyscome muelleri</i> group</b>
22. <i>B. rigidula</i> (DC.) G.L.R.Davis	51. <i>B. muelleri</i> Sond.
23. <i>B. rudallensis</i> P.S.Short	52. <i>B. muelleroides</i> G.L.R.Davis
24. <i>B. tatei</i> J.M.Black	53. <i>B. ptychocarpa</i> F.Muell.
25. <i>B. tesquorum</i> J.M.Black	<b><i>Brachyscome multifida</i> group</b>
26. <i>B. trachycarpa</i> F.Muell.	54. <i>B. abercrombiensis</i> P.S.Short
27. <i>B. xanthocarpa</i> D.A.Cooke	55. <i>B. dissectifolia</i> G.L.R.Davis
<b><i>Brachyscome decipiens</i> group</b>	56. <i>B. melanocarpa</i> Sond. & F.Muell. ex Sond.
28. <i>B. decipiens</i> Hook.f.	56a. subsp. <i>melanocarpa</i>
<b><i>Brachyscome dentata</i> group</b>	56b. subsp. <i>thompsonensis</i> P.S.Short
29. <i>B. chrysoglossa</i> F.Muell.	57. <i>B. microcarpa</i> F.Muell.
	57a. subsp. <i>microcarpa</i>
	57b. subsp. <i>darlingensis</i> P.S.Short
	58. <i>B. multifida</i> DC.
	59. <i>B. nova-anglica</i> G.L.R.Davis
	60. <i>B. stuartii</i> Benth.
	61. <i>B. tamworthensis</i> P.S.Short
	62. <i>B. trisecta</i> P.S.Short
	<b><i>Brachyscome nivalis</i> group</b>
	63. <i>B. barkerae</i> P.S.Short
	64. <i>B. nivalis</i> F.Muell.
	65. <i>B. radicans</i> Steetz
	66. <i>B. stolonifera</i> G.L.R.Davis
	67. <i>B. tadgellii</i> Tovey & P.Morris
	68. <i>B. walshii</i> P.S.Short
	<b><i>Paquerina</i> group</b>
	69. <i>B. foliosa</i> P.S.Short
	70. <i>B. graminea</i> (Labill.) F.Muell.
	71. <i>B. obovata</i> G.L.R.Davis
	72. <i>B. radicata</i> Hook.f.
	73. <i>B. scapigera</i> (Sieber ex Spreng.) DC.
	74. <i>B. staceae</i> P.S.Short
	75. <i>B. tasmanica</i> P.S.Short
	76. <i>B. tenuiscapa</i> Hook.f.
	<b><i>Brachyscome triloba</i> group</b>
	77. <i>B. brownii</i> P.S.Short
	78. <i>B. formosa</i> P.S.Short
	79. <i>B. kaputarensis</i> P.S.Short
	80. <i>B. mittagongensis</i> P.S.Short
	81. <i>B. petrophila</i> G.L.R.Davis
	82. <i>B. procumbens</i> G.L.R.Davis
	82a. subsp. <i>procumbens</i>
	82b. subsp. <i>wombelongensis</i> P.S.Short
	83. <i>B. salkiniae</i> P.S.Short
	84. <i>B. sieberi</i> DC.
	85. <i>B. triloba</i> Gaudich.
	86. <i>B. willisii</i> P.S.Short
	<b><i>Brachyscome whitei</i> group</b>
	87. <i>B. whitei</i> G.L.R.Davis
	87a. subsp. <i>whitei</i>
	87b. subsp. <i>lophoptera</i> P.S.Short

185, pl. x no. 1). **Islectotypes:** FI (? n.v.); G 00222789 (ex Webb 1834); P (? n.v.).

*Brachyscome billardi* Cass. in F.Cuvier, Dict. Sci. Nat. 5 (suppl.): 64 (1817) ("billardieri"), nom. illeg. — **Type citation:** "La brachyscome de Labillardière ... Elle habite la terre de Van-Leeuwen." **Lectotype & islectotypes:** as for *B. aculeata*.

*Brachyscome stricta* DC., Prodr. 5: 305 (1836) ("*Brachycome*"), nom. illeg. (*Bellis aculeata* Labill. cited in synonymy); W.M.Curtis, Stud. Fl. Tasman. 296 (1963) ("*Brachycome*"). — **Type citation:** "[perennial] in Novae-Hollandiae terrâ Van-Leuwin ... v. s. comm. à cl. Labill." **Lectotype & islectotypes:** as for *B. aculeata*.

*Brachyscome sieberi* var. *gunnii* DC., Prodr. 5: 306 (1836) ("*Brachycome*"). — **Type citation:** "Cl. Gunn. legit in insulâ Van-Diemen. (v.s. comm. a cl. Lindl.)." **Lectotype (here designated):** Van Diemen's Land, R.C. Gunn 388 (G-DC, ex Lindley 1834). **Remaining syntype:** Van Diemen's Land, R.C. Gunn ?222 (G-DC, ex Lindley 1836).

*Brachyscome leucanthemifolia* Benth. in Endl. et al., Enum. Pl. Huegel 60 (Apr. 1837) ("*Brachycome*"). — **Type citation:** "Van Diemen's Land. (Ferd. Bauer.)" **Holotype:** Nova Holland. Ins. & Cap... v. Diemen (W). **Isotype:**

Australia, F. Bauer (K 000882308, ex Herb. Mus. Vind. 1836).

Perennial, stoloniferous herb, branches ascending to erect, 20–60 cm long; with stalked, glandular hairs common at least below the capitula, the hairs commonly 0.1–0.2 mm long but rarely to c. 0.7 mm. *Leaves* mostly cauline with the basal rosette not persisting, glabrous or with a scattered to comparatively dense indumentum of stalked, broad-based, glandular hairs; lowest to about mid-cauline leaves oblanceolate to linear-oblanceolate or narrowly oblong, 2–9 (15) cm long, 0.35–1.5 cm wide, entire or toothed or shortly lobed, the teeth or lobes mostly straight-edged, 3–10 (17) per leaf and usually occurring in the upper ½ of the leaf but sometimes towards the base; cauline leaves decreasing in size towards the capitulum and usually with fewer lobes than basal leaves, the uppermost one(s) usually entire and narrowly elliptic or lanceolate. *Flowering branches*, with an indumentum of stalked glandular hairs, particularly dense below the capitulum

but often well-developed along much of the length of the branch. *Involucre* 8–17 mm diam. *Bracts* c. 12–20, of c. equal length and in more or less 1 or 2 rows, obovate to oblanceolate or elliptic in outline, 5–8 mm long, 1.7–2.5 mm wide, some wholly herbaceous but mostly with scarious margins, the apex obtuse to acute, glandular hairs usually on the margins and often much of the outer surface, scarious margins and apex sometimes purplish. *Receptacle* concave. *Ray corollas* 10–20 mm long, usually white, sometimes white above and bluish beneath. *Disc florets* 5-lobed. *Stamens* 5. *Style appendages* widely deltate, c.  $\frac{1}{2}$  the length of the stigmatic part. *Cypselas*, thin, flat, obovate to widely obovate, 3–4.5 mm long, 2.1–3 mm wide, lateral surfaces of cypselas body smooth or minutely tuberculate and with eglandular, biseriate curved hairs, at least immature cypselas with some elongate glandular hairs with globular apices; wing-like margins entire or irregularly dissected, with short, straight or curved eglandular hairs along their length; pericarp with 2 vascular bundles; sclerenchymatous tissue extending around the fruit body (where it is only 1 or 2 cells wide) but absent from the wing-like extension; testa cells evenly thickened (Rogers, MEL 503490); carpopodium present. *Pappus* a crown of short bristles c. 0.4–0.5 mm high, just exceeding the apical notch. *Chromosome number*:  $n = 9, 18, 27$ . **Fig. 1A, 9B.**

*Distribution.* Eastern Australia, from New England to Tasmania and as far west as the Grampians in Victoria and the extreme south-east of South Australia.

*Habitat.* Mainly in wet sclerophyll woodland or forests. In the high country mainly occurring in or on the edge of Snow Gum woodland and not extending into exposed herbfield.

*Phenology and reproductive biology.* Flowering has been recorded from October to April.

Stace's data (Stace 1981) indicate that *B. aculeata* is self-incompatible, which is consistent with the high pollen:ovule ratio of 3,571 recorded for a capitulum of *P.S. Short* 3996 with 45 ray and 191 disc florets.

Salkin et al. (1995) recorded that plants, at least under garden conditions, sucker and that seed sown in autumn germinates in 14–30 days.

*Cytology.* Tetraploid and hexaploid populations of this species have been recorded, with all tetraploids from the central part of the species range (Omeo region, Vic.; Piccadilly Circus, ACT; Braidwood and the Kosciusko region, N.S.W.) and the only record of a tetraploid from the Grampians, western Victoria (e.g. Stace 1981, Watanabe et al. 1996b).

Idiograms of somatic metaphase chromosomes have been published from the Sawyer's Hill population (*Short* 3982; Watanabe et al. 1996a, Fig. 11; Watanabe et al. 1999, Fig. 25) and from Burns Bay, Tasmania (*Greig* 90, under the name *B. sieberi* var. *gunni*, Watanabe et al. 1999, Fig. 34).

*Typification.* Candolle, when erecting the name *B. stricta*, recorded that he had a herbarium specimen of *Bellis aculeata* which he had received from Labillardière ("v. s. comm. à cl. Labill."; Candolle 1836, p. 305) and it is this specimen now housed in G-DC that Davis chose as the lectotype of the name, *Bellis aculeata*. I am not aware if a specimen is also housed in FI and have not seen the apparent duplicate noted by Davis as occurring in P, although there is a further specimen in G (G 00222789) which, on the assumption that Labillardière collected the species on just one occasion, I take to be an isolectotype (it is erroneously labelled as the lectotype and was received from Webb). In the absence of evidence to the contrary I accept, as did Stace (1981), Davis's decision to select the G-DC specimen as the lectotype, the same specimen also being the lectotype of the names *B. billardierei* and *B. stricta*.

Labillardière visited Australia in 1792, collecting from Esperance Bay in "terrâ Van-Leuwin" (Western Australia) and in Tasmania, and later publishing *Novae Hollandiae plantarum specimen*. Nelson (1975) has shown that for some species described in that work Labillardière cited incorrect locality details, a result of him either having confused labels or of describing species collected by other botanists. As it occurs throughout Tasmania it seems probable that Labillardière collected the specimen but confused his labels.

Davis (1948, p. 186) recorded that "syntype material of *B. sieberi* (New Holland, 1825, Sieber, No. 485) and *B. sieberi* var. *gunnii* ("Van Diemen's Land, Gunn") is at Geneva" and that "the above-mentioned specimens were nominated lectotypes of the species and variety respectively ...". All relevant specimens are on the same sheet and she illustrated them in plate 9, part 2. Unfortunately she annotated the illustrated Sieber specimen as the lectotype of var. *gunnii*. This annotation is here accepted as an error, with the Sieber specimen being the lectotype of *B. sieberi*, as also considered to be the case by Stace (1981). However, Davis did not annotate either of the Gunn specimens as the lectotype of the name var. *gunnii* and as both are labelled as coming from Van Diemen's Land and have different numbers I do not consider her to have effectively chosen a lectotype. I have therefore chosen *R.C. Gunn* 388 as the lectotype, the original label reading "388 ...Gunn – a vandiemen env. par Lindley 1834".

The JSTOR website, when viewed in August 2012, displayed a supposed type specimen (P 00742960) of *Brachyscome billardieri* [sic], also labelled as *Bellis aculeata*, but the woody base alone clearly shows that it is not of this species or, indeed, a member of *Brachyscome* s.lat.

*Notes.* This is a polymorphic species exhibiting considerable variation in general robustness of habit, leaf size and indumentum. For example, *McBarron* 7385 (NSW 58978, NSW 1000360) from Paddy's River Falls, Tumbarumba exhibits a general indumentum of stalked, glandular hairs that are c. 0.5–0.7 mm long, whereas in

most specimens the hairs are no more than c. 0.2 mm long. At least with some specimens, robustness appears to be associated with high ploidy levels.

Stace considered Tasmania to be home to two taxa belonging to the *B. aculeata* complex, i.e. *B. spathulata* and *B. sieberi* var. *gunnii*, with *B. aculeata* restricted to the mainland. However, she did note that *B. sieberi* var. *gunnii* and specimens she referred to as “aff. *aculeata*” from Mt Gingera (ACT) were similar. I believe that not only are the Mt Gingera and Tasmanian populations of the same species but they are also morphologically indistinguishable from the bulk of the other mainland collections and here refer them to *B. aculeata*.

#### *Selected specimens examined.*

SOUTH AUSTRALIA: Glenelg River rocks, Donovan’s Landing, Dec. 1968, K.M. Alcock 204 (AD).

NEW SOUTH WALES: Mt Kosciuszko NP, behind huts at Sawpit Creek, 4 Feb. 1993, P.S. Short 3996 (AD, BRI, CANB, CHR, HO, MEL, NSW, TI); c. 6 km from Cathcart towards Rocky Hall, 6 Feb. 1993, P.S. Short 4010 (AD, BRI, CANB, CHR, HO, MEL, NSW, TI).

VICTORIA: Walking track to Mackey’s Peak, Grampians, 28 Dec. 1968, A.C. Beauglehole 30196 (MEL); Bundara River crossing, 3 km N of Anglers Rest, 9 Feb. 1993, P.S. Short 4018 (CANB, MEL, TI).

TASMANIA: Nubeena, Nov. 1951, W.M. Curtis (HO 52220); 8 miles S of Swansea, 13 Feb. 1971, H.M. Stace 7616 (SYD).

## 2. *Brachyscome ascendens* G.L.R.Davis

Proc. Linn. Soc. New South Wales 73: 175, Fig. 37, 43, pl. vi, map 14 (1948) (“*Brachycome*”); E. Salkin et al., Austral. Brachyscomes 44 (1995). — **Type citation:** “*Holotype*: Robert’s Plateau, National Park, Queensland, ‘Herb growing on rock faces in open forest. Flowers lavender’, 28.5.1929, C.T. White, n. 6078 (BRI). *Paratypes*: l.c., seven (BRI, NSW, MEL).” **Holotype**: BRI 010106. **Isotypes**: BRI 445372 (n.v., as per annotation on holotype folder), CANB 20593, K 00082179, NSW 15288, MEL 220863.

Perennial, stoloniferous herb, branching from basal and upper nodes; branches weakly ascending to somewhat erect, to c. 35 cm long, with stalked glandular hairs. Leaves basal and cauline, all with stalked glandular hairs, mostly oblanceolate, 7–40 mm long, 2–12 mm wide, mostly toothed or lobed, the teeth or lobes somewhat straight-edged or rounded, 2–12 per leaf and incised less than ½ way to the midrib, one or more leaves sometimes entire; cauline leaves decreasing in size towards the capitulum and usually with fewer lobes than basal leaves, the uppermost one(s) often entire and lanceolate or almost linear. Flowering branches angular, with a sparse to conspicuous indumentum of stalked glandular hairs. Involucre 7–11 mm diam. Bracts c. 12–18, of c. equal length and in 1 row, elliptic to narrowly elliptic or obovate, apically rounded, 3.5–4.6 mm long, 1–2.2 mm wide, mainly green and herbaceous but with prominent scarious margins and apex which may be purplish, the outer surface usually with stalked glandular hairs. Receptacle convex to subconical. Ray corolla c. 8–10 mm long, mauve, lavender or lilac. Disc florets

5-lobed. Stamens 5. Cypselas thin, flat, obovate, 1.9–2.3 mm long, 1–1.5 mm wide, brown; lateral surfaces of body evenly covered with prominent tubercles, each of which terminates in an eglandular, biseriate curved hair, a few stalked glandular hairs may be present; wing-like margins dissected, each lobe terminating with a short, curved eglandular hair or sometimes with a stalked glandular hair; apically almost truncate and not manifestly notched; carpodium present. Pappus a crown of short bristles c. 0.15–0.3 mm long.

*Distribution.* Only known from the McPherson Range and regions to the east near the Queensland-New South Wales border. A specimen (I.R. Telford 9722) which lacks mature fruit and collected from Purlingbrook Falls, Springbrook Plateau may be of this species. It is also assumed that A.N. Rodd 2251 is from Mt Lindesay and not Mt Lindsay; the latter would be a major disjunction in distribution.

*Habitat.* All collections are from rocky slopes in woodland or forest, collectors’ notes indicating that it is associated with basalt and, depending on the identity of I.R. Telford 9722, also rhyolite.

*Phenology and reproductive biology.* No information is available other than that flowering specimens have been collected in April, October and December, specimens with mature fruit in May and October.

*Notes.* From the little information available it appears that this species never has white rays, being described by collectors as having lavender or lilac rays and by Salkin et al. (1995) as mauve. The rays do not retain their colour but become yellowish-white on drying.

Morphologically, *B. ascendens* appears to be distinguishable from all other members of the *B. aculeata* complex by the almost truncate apex of the cypselas, the wing-like margins in the cypselas of other species forming a distinct apical notch. The distinction seems somewhat trivial and given the variation exhibited in many specimens here included under *B. aculeata* the maintenance of this taxon as a distinct species may prove untenable.

Vegetatively the taxon is also difficult to distinguish from some forms of *B. nova-anglica*; indeed mature fruit are virtually essential for identification and it is possible that I have erred in referring some specimens to this species.

#### *Additional specimens examined.*

QUEENSLAND: Fort Buchanan, in damp rocky crevices, 16 Apr. 1938, D.A. Goy & L.S. Smith 263 (BRI 272440); Mt Lind[e]say, 9 Nov. 1972, A.N. Rodd 2251 (NSW); Moran’s Falls, Roberts Plateau, McPherson Range, in crevice in basalt rock face, exposed cliff top, 1 Oct. 1973, I.R. Telford 3381 (CBG); near Moran’s Falls, Roberts Plateau, Feb. 1912, C.T. White (BRI 272439); Macpherson Range, open forest country, Jan. 1919, C.T. White (BRI 446669).

NEW SOUTH WALES: The Pinnacle, Border Ranges N.P., 6 Apr. 1994, P.I. Forster 15098 (MEL).



Fig. 13. *Brachyscome cuneifolia*, near Daly Head, Yorke Peninsula, S.A. — P.S. Short 3909.



Fig. 14. *Brachyscome spathulata*, Kosciusko N.P., N.S.W. — P.S. Short 4003

### 3. *Brachyscome cuneifolia* Tate

Trans. Proc. Roy. Soc. South Australia 11: 83 (1889) ("*Brachycome*"); J.M.Black, Fl. S. Austral. 1st ed., 587 (1929) ("*Brachycome*"); H.M.Stace, Austral. J. Bot. 29: 425–440 (1981); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1450, Fig. 654G (1986) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 76 (1995); P.S.Short in N.G.Walsh & Entwistle, Fl. Victoria 4: 839, Fig. 169d (1999). — **Type citation**: "Bushy places near Fountain." **Lectotype**: Port Lincoln, [Nov. 1887], *R. Tate* (AD 97631385 p.p.). (Davis 1948, p. 185). **Isolectotypes**: AD 97631385 p.p., AD 98028242 p.p. (herb. J.M. Black; several fruit and florets only).

[*Brachyscome aculeata* auct. non (Labill.) Less.: G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 183, Fig. 58, pl. vi, map 17, pl. x, 1 & 2 (1948) ("*Brachycome*"), p.p., excluding *B. aculeata* & *B. spathulata*; E.L.Robertson, J.M.Black's Fl. S. Austral., 856, Fig. 1152X (1965, rev. edn) ("*Brachycome*"); J.H.Willis, Handb. Pl. Victoria 2: 675 (1973) ("*Brachycome*"), excl. *B. aculeata* & *B. spathulata*.]

Perennial, stoloniferous herb, branching from the base or near basal nodes; branches ± erect, 10–35 cm long. *Leaves* basal and cauline, but most leaves commonly in a usually persistent basal rosette, all leaves glabrous or with scattered, stalked glandular hairs, a few cottony, eglandular hairs sometimes present; basal leaves spatulate or oblanceolate, 1.7–9 cm long, 0.5–2 cm wide, mostly shallowly toothed or lobed, the teeth or lobes somewhat straight-edged or rounded, 3–11 per leaf, one or more leaves sometimes entire; cauline leaves decreasing in size towards the capitulum and usually with fewer lobes than basal leaves, the uppermost one(s) often entire and narrowly elliptic or almost linear. *Flowering branches* angular, with an indumentum of stalked glandular hairs but mostly developed below the capitulum. *Involucre* 0.7–1.2 cm diam. *Bracts* c. 16–24, of c. equal length and in c. 1 row, elliptic to narrowly elliptic or obovate in outline, apically rounded to somewhat acute, 4.5–7 mm long, 1.3–2.3 mm wide, mainly green and herbaceous but with prominent scarious margins and apex, the apex and upper margins often conspicuously purplish,

the outer surface usually glabrous, sometimes with a few, inconspicuous stalked glandular hairs. *Receptacle* convex to subconical. *Ray corolla* 10 mm long, mainly white but possibly mauve, at least on the under surface. *Disc florets* 5-lobed. *Stamens* 5. *Style appendages* deltate, c. ½ the length of the stigmatic part. *Cypselas* thin, flat, very widely obovate to obovate, 2.5–3.5 mm long, 1.5–2.5 mm wide, brown; lateral surfaces of cypselas body with scattered tubercles terminating in eglandular, biseriate curved hairs, some glandular hairs may be present; wing-like margins dissected, with short, curved eglandular hairs along their length; carpopodium present. *Pappus* a crown of short bristles c. 0.2–0.3 mm long, shorter than to barely exceeding the apical notch. *Chromosome number*:  $n = 9$ . **Fig. 13.**

*Distribution*. Ranges from southern Eyre Peninsula east to western Victoria.

*Habitat*. In various communities, commonly mallee eucalypt-dominated. At least on southern Yorke Peninsula the species grows in sandy soils over limestone.

*Phenology and reproductive biology*. Flowering has been recorded from August to November. An estimated pollen:ovule ratio of 2,848 was determined from *P.S. Short 3909* (Fig. 13); the single capitulum had 45 ray and 111 disc florets.

Salkin et al. (1995) recorded that seed germinates in 10–25 days.

*Cytology*. Stace (1981) reported  $n = 9$  and  $2n = 18$  for two populations from near Corny Point, Yorke Peninsula and Watanabe et al. (1999, Fig. 27) published an idiogram of somatic metaphase chromosomes from *E. Salkin 111* from Tintinara, South Australia.

*Typification*. The published locality for the type collection was given as Fountain, but the locality on the label accompanying the lectotype specimen chosen by Davis is Port Lincoln. There appears to be no other specimens in herbaria which could be considered to be types and the discrepancy is seemingly explained by the

introduction to the paper in which Tate described the species. He noted that he collected in early November, 1887 “in the Port Lincoln district ... the route was from Port Lincoln by way of Little Swamp, the Fountain, to Lake Wangary, to Marble Range, to Kellidie Bay ... and back to the seaport.” Hence, the Port Lincoln label can be viewed as a general locality label. It is also evident that J.M. Black considered the lectotype specimen chosen by Davis to be the type. In his herbarium (AD 98028242 p.p.) there is a sheet on which he has drawn what is clearly the specimen selected by Davis. He (Black) labelled the drawing as “Type, Port Lincoln, of *B. cuneifolia*” and several florets and fruit taken from Tate’s collection are fixed to the sheet.

**Notes.** As it has white rays this species is sometimes confused with *B. aculeata*. However, in that species, if the basal leaves are retained then they are rarely spatulate and the outer surface of the involucre bracts are not glabrous but have stalked, glandular hairs.

#### *Selected specimens examined.*

SOUTH AUSTRALIA: Clarendon Road at Cherry Gardens turnoff, 8 Oct. 1951, *J.B. Cleland* (AD 97220208); Hundred of Carribee, 9 Nov. 1984, *P.J. Lang* 8916 (AD); Marble Range, 2 Oct. 1979, *D.E. Symon* 11803 (AD).

VICTORIA: Deep Lead Flora & Fauna Reserve, 7 Oct. 1981, *A.C. Beaglehole* 69121 (MEL); Shire of Dimboola, 23 Sept. 1900, *F.M. Reader* (MEL 1562548).

#### 4. *Brachyscome riparia* G.L.R.Davis

Proc. Linn. Soc. New South Wales 79: 206, Fig. 14–17 (26 Jan. 1955); J.H. Willis, Handb. Pl. Victoria 2: 675 (1973); E. Salkin et al., Austral. Brachyscomes 204 (1995); P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 838, Fig. 169b (1999). — **Type citation:** “*Holotype:* Snowy River, east of Butcher’s Ridge, ‘in crevices and among porphyry rocks, below flood level’, 22.1.1954; N. A. Wakefield, No. 4804 (MEL). *Paratypes:* Three. *Loc. cit.* (MEL.)” **Holotype:** MEL 545184. **Isotypes:** MEL 545183, NSW 230554.

Perennial, possibly stoloniferous, sprawling to weakly erect herb to c. 40 cm tall, with an indumentum of stalked glandular hairs about 0.2 mm long. *Leaves* cauline, obovate, 0.5–7.5 cm long, 0.1–0.9 cm wide, mainly with 3–9 teeth but uppermost leaves entire, all leaves glabrous or with glandular hairs. *Peduncles* extending well above the leaves, usually minutely glandular hairy but becoming glabrous after fruit set. *Involucre* 5–7 mm diam. *Bracts* 15–25, in about 1 row, somewhat oblanceolate but with acute or more rarely somewhat rounded apices, 2.5–4.6 mm long, 0.6–1 mm wide, with stalked glandular hairs on surface and margins. *Receptacle* subconical, areolate. *Ray florets* c. 12–20 (45), white or mauve, c. 10 mm long. *Disc florets* 28 in one capitulum with 18 ray florets, otherwise not recorded; corolla yellow, 5-lobed. *Stamens* 5; anthers each with a terminal apical appendage. *Style* appendages triangular, shorter than the stigmatic part. *Cypselas* monomorphic, thin, flat, obovate or elliptical, 2.2–2.8 mm long, 1.4–1.7 mm wide, brown, somewhat

discolorous with the wing-like margins paler than the fruit body; lateral surfaces smooth; wing-like margins 0.3–0.4 mm wide, dissected and the edges with biseriate straight to curved eglandular hairs; pericarp with 2 vascular bundles; sclerenchymatous tissue extending around the fruit body (where it is only 1 or 2 cells wide) but absent from the wing-like extension; testa cells evenly thickened (*N.G. Walsh* 127); carpodium present. *Pappus* of a few bristles c. 0.4–0.5 mm long, slightly shorter than to slightly exceeding the apical notch. *Chromosome number:*  $n = 9$ . **Fig. 1B.**

**Distribution.** All specimens examined are from eastern Victoria, and all but one from the Snowy, Buchan and Genoa rivers. The other specimen (Albrecht, MEL 2028635) is from the gorge of Moroka River.

**Habitat.** Apparently confined to the margins of rivers, growing among rocks in association with species such as *Acacia boormannii*, *Dodonaea rhombifolia*, *Kunzea ericoides* and *Pomaderris oblongifolia*.

**Phenology and reproductive biology.** Flowering has been recorded from November to March.

Salkin et al. (1995) recorded freshly collected seed as having germinated in 18–25 days; they also recorded that the abundant cypselas are quickly shed at maturity.

**Cytology.** The only chromosome determination, of  $n = 9$ , for *B. riparia* was reported by Watanabe & Short (1992) for a population at Tulach Ard Gorge. Watanabe et al. (1999, Fig. 23) published an idiogram of somatic metaphase chromosomes from the same population (*Walsh* 2409).

**Notes.** A specimen collected by *D.E. Albrecht* (MEL 2028635) from the Moroka River is of a robust plant in which the apices of the involucre bracts tend to be more rounded than in other specimens and the strongly curved eglandular hairs on the cypselas are atypical. Further collections are required to ascertain whether it is worthy of recognition as a distinct taxon.

#### *Selected specimens examined.*

VICTORIA: Snowy River, near “Gentle Annie” rapid, 26 Nov. 1990, *D.E. Albrecht* 4674 (MEL); Tulach Ard section of Snowy River, 10 March 1966, *E.J. Carroll* (CBG 024526); Genoa River, Wangarabell [as “Wangrabelle”], March 1948, *N.A. Wakefield* 2222 (MEL, 3 sheets); Genoa River, near Maramingo Hill, 1 Jan. 1954, *N.A. Wakefield* 4803 (CANB, MEL, NSW); Tulach Ard Gorge, 1.9 km NNW from helipad on Museum Spur, west bank of Snowy River, 15 Nov. 1988, *N.G. Walsh* 2409 (MEL).

#### 5. *Brachyscome spathulata* Gaudich.

in Freyc., Voy. Uranie 468 (1830) (“*Brachycome*”); H.M. Stace, Austral. J. Bot. 29: 425–440 (1981); J. Everett in G.J. Harden, Fl. New South Wales 3: 165 (1992) (“*Brachycome*”); E. Salkin et al., Austral. Brachyscomes 216 (1995); P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 839, Fig. 169c (1999). — *B. spathulata* subsp. *spathulata*: M. Gray in Costin et al., Kosciuszko Alpine Fl. 2nd ed. 186, 329 (2000). — **Type citation:** “In Novae

Hollandiae orā orientali (Port-Jack.); cum sequentibus.” (comment on p. 467 under *B. triloba* and also applying to *B. spathulata* and *B. dentata*). **Holotype:** Urainie/Port Jackson, undated, *C. Gaudichaud* (P 00731619, scan seen; photo in Stace 1981, Fig. 1).

*Brachyscome scapiformis* DC., Prodr. 5: 306 (1836) (“*Brachycome*”); W.M.Curtis, Stud. Fl. Tasman. 296 (1963) (“*Brachycome*”). — **Type citation:** none given. **Lectotype:** Smith’s Plain, Lachlan River, New South Wales, 25 June 1817, *A. Cunningham* (G-DC). (Davis 1948, p. 168, t. 10, Fig. 2). **Isolectotype:** K.

*Brachyscome scapiformis* var. *puberula* DC., Prodr. 5: 306 (1836) (“*Brachycome*”). — **Type citation:** “in Smith’s Plains ad Lachlan river in Novā-Hollandiā inter junio flor. legit cl. Cunningham. (v.s. comm. à cl. inv.)” **Lectotype & isolectotype:** as for *B. scapiformis* (see typification notes below).

*Brachyscome scapiformis* var. *glabra* DC., Prodr. 5: 306 (1836) (“*Brachycome*”). — *B. spathulata* subsp. *glabra* (DC.) Stace, Austral. J. Bot. 29: 436 (1981). — **Type citation:** “in insulā Van-Diemen legit cl. Gunn. (v.s. comm. à cl. Lindl.)” **Syntypes:** Van-Diemens Land, *R.C. Gunn* 168 (G-DC, received from Lindley in 1834), Van-Diemens Land, *R.C. Gunn* 320 (G-DC, received from Lindley in 1834). **Possible isosyntypes:** Van Diemen’s Land, *R.C. Gunn* 168 (MEL 1562510, ex herb. Steetz, W), *R.C. Gunn* 320 (NSW 229856, collected or distributed in 1833), Van Diemen’s Land, *Anon.* (W, received from Lindley in 1837).

*Brachyscome scapiformis* var. *montana* Hook.f., Hooker’s London J. Bot. 6: 114 (1847) (as “*Brachycome scapaeformis*”). — **Type citation:** “Mt. Wellington, summit; Gunn.;—v. v. n.” **Type:** presumably K, no written record of having seen appropriate specimen(s).

*Brachyscome* sp.: M. Gray in Costin et al., Kosciusko Alpine Fl. 1st ed. 232, Fig. 295, 296 (1979) (“*Brachycome*”).

[*Brachyscome aculeata* auct. non (Labill.) Less.: G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 183, Fig. 58, pl. vi, map 17, pl. x, 1 & 2 (1948) (“*Brachycome*”), p.p., excluding *B. aculeata* & *B. cuneifolia*; J.H. Willis, Handb. Pl. Victoria 2: 675 (1973) (“*Brachycome*”), excl. *B. aculeata* & *B. cuneifolia*.]

[*Brachyscome leucanthemifolia* auct. non Benth.: DC., Prodr. 7: 277 (1838) (“*Brachycome*”), as to specimens in herb. G-DC.]

Perennial, stoloniferous herb, mostly branching from the base but occasionally at upper nodes; branches ascending to erect, to c. 60 cm long. *Leaves* basal and cauline, but most leaves commonly in a usually persistent basal rosette, at least the upper leaves with a sparse to dense indumentum of stalked glandular hairs, the lower leaves often glabrous or almost so; basal leaves spatulate or obovate to oblanceolate, 1.7–11 cm long, 0.6–3 cm wide, mostly shallowly toothed or lobed, the teeth or lobes somewhat rounded, 4–19 per leaf, a few leaves may be entire; cauline leaves decreasing in size towards the capitulum and usually with fewer lobes than basal leaves, the uppermost one(s) often entire and narrowly elliptic, lanceolate, oblanceolate or linear and with the apex acuminate or attenuate and often somewhat hyaline. *Flowering branches* with an indumentum of stalked glandular hairs, being particularly dense below the capitulum. *Involucre* 1–1.5 cm diam.; *Bracts* c. 20–30, of c. equal length and in c. 1 row, somewhat

narrowly elliptic or oblanceolate in outline but apically always extremely acute to attenuate, 6–9 mm long, 1–1.7 mm wide, mainly green and herbaceous but with scarious margins and apex, the apex often purplish, much of the outer surface beset with stalked glandular hairs. *Receptacle* convex. *Ray corolla* 10–16 mm long, mauve or blue. *Disc florets* 5-lobed. *Stamens* 5. *Style appendages* deltate, c. ½ the length of the stigmatic part. *Cypselas* monomorphic, thin, flat, obovate, 2.2–5 mm long, 1.1–2.5 mm wide, brown; lateral surfaces of cypselas body with or without scattered tubercles terminating in eglandular, biseriate curved hairs, some glandular hairs may be present; wing-like margins entire or slightly dissected, with short, curved eglandular hairs along their length; pericarp with 2 vascular bundles; sclerenchymatous tissue well-developed around the vascular bundles but absent from the surrounds of the fruit body and the wing-like extension; testa cells with u-shaped thickening (*P.S. Short* 1363); carpodium present. *Pappus* a crown of short bristles c. 0.3–0.5 mm high, inserted in an apical notch. **Fig. 14.**

**Distribution.** North-eastern New South Wales south to Victoria and Tasmania. In Victoria mainly confined to the east but also in the Grampians.

**Habitat.** Ranges from the coast to lowland forest and into the alps, where it may grow in Snow Gum (*Eucalyptus pauciflora*) communities and open herbfields and feldmarks.

**Phenology and reproductive biology.** Flowering has been recorded from September to June.

A capitulum of *P.S. Short* 3977 with 43 ray and 94 disc florets had a pollen:ovule ratio of 4,360, a figure suggesting the possibility of self-incompatibility and consistent with the almost negligible seed set in selfed plants recorded by Stace (1981).

Salkin et al. (1995) recorded seed germinating well in 6–40 days.

**Cytology.** Polyploidy is widespread in this taxon. Only diploids have been recorded from northern regions of New South Wales and from Tasmania but *4n*, *6n*, *8n* and *10n* specimens have been recorded from the central range of the species (e.g. Stace 1981, Watanabe et al. 1996b). An idiogram of somatic metaphase chromosomes for a diploid was published by Watanabe et al. (1999, Fig. 31).

**Typification.** When describing *B. scapiformis* Candolle (1836) cited no specimens after the description of the species, but immediately followed it with the description of two varieties, var. *puberula* and var. *glabra*. Davis (1948, p. 186) subsequently noted that “only the former variety bears fruit and was nominated lectotype”. As with Stace (1981) I consider Davis to have selected the lectotype for both the names *B. scapiformis* var. *puberula* and *B. scapiformis*.

Specimens, i.e. *R.C. Gunn* 168 and *R.C. Gunn* 320, that must be syntypes of *B. scapiformis* var. *glabra* are in



G-DC and are mounted on the same sheet. With Gunn's use of taxon numbers and method of providing both date of collection and the date of dispatch of specimens it can be difficult to ascertain if specimens are duplicates when label data are incomplete. Thus, the specimen of *R.C. Gunn 168* that formed part of the Steetz herbarium has no date of collection or dispatch by Gunn, only the note that Steetz received it from Zuccarini in 1844. I have seen five other sheets of *168* but all were collected after 1834. The specimen of *R.C. Gunn 320* in NSW was dispatched or collected in 1833, making it a possible duplicate of the specimen in G-DC which was received by Candolle from Lindley in 1834.

The name *Brachyscome scapiformis* var. *montana* Hook.f., was not accounted for by either Davis (1948) or Stace (1981). In a draft description compiled more than 15 years ago I placed it under *B. spathulata* but I have since found no photograph of the purported type specimen at K or my notes to justify this action. However, as *B. spathulata* is the only species of the genus I know to occur on the summit of Mount Wellington, I maintain the synonymy.

**Notes.** Stace (1981) recognised two subspecies of *B. spathulata*, i.e. subsp. *spathulata* and subsp. *glabra*, with the latter apparently restricted to Tasmania. However, considerable variation in distribution of the indumentum and in the size of plants, leaves and mature cypselas occurs throughout the range of the species and I do not believe that its recognition, essentially on the basis that the radical leaves are glabrous, is tenable. This feature is, however, a useful one for helping distinguish between Tasmanian specimens of *B. aculeata* and *B. spathulata*.

Gray (2000) noted that in the Mt Kosciuszko region a small form is mainly associated with feldmarks while a comparatively robust form grows in heaths and tall herbfields. This is almost certainly associated with differences in ploidy level.

#### *Selected specimens examined.*

NEW SOUTH WALES: summit of Sawyers Hill, Kosciusko NP, 3 Feb. 1993, *P.S. Short 3985* (AD, CANB, HO, MEL, NSW, TI).

AUSTRALIAN CAPITAL TERRITORY: Mt Gingera, 5 Mar. 1953, *R.D. Hoogland 3161* (CANB).

VICTORIA: Forlorn Hope Plain, Nunniong Plateau, 30 Dec. 1984, *D.E. Albrecht 1389* (MEL); c. 2 km E of Noorinbee, 12 Sept. 1985, *S.J. Forbes 2862* (MEL).

TASMANIA: Wild Dog Tier, 9 Mar. 1984, *A. Moscal 6825* (HO); Midway Point, 3 Aug. 1984, *A. Moscal 8399* (HO).

### ***Brachyscome basaltica* group**

*Brachyscome basaltica* group: P.S.Short in N.G.Walsh & Entwisle, *Fl. Victoria* 4: 841 (1999).

Stoloniferous perennial or non-stoloniferous annual herbs. Leaves entire or rarely with several teeth. Terminal anther appendages present. Cypselas monomorphic, swollen or somewhat laterally compressed, longitudinal ridges absent or present but sometimes poorly formed,

unwinged. Pappus usually an entire ring. Chromosome numbers:  $n = 6, 8$ .

**Distribution.** Eastern Australia.

**Notes.** All three species recognised are united in their cypselas morphology, the ring-like pappus, mostly entire leaves, and a propensity to grow in seasonally inundated areas.

### **6. *Brachyscome basaltica* F.Muell.**

Fragm. 1: 50 (1858) ("*Brachycome*"). — *Brachyscome basaltica* var. *basaltica*: Benth., *Fl. Austral.* 3: 515 (1867) ("*Brachycome*"); G.L.R.Davis, *Proc. Linn. Soc. New South Wales* 73: 173, Fig. 35, 42, pl. vi, map 13 (1948) ("*Brachycome*"), but fruit in Fig. 42 immature or of *B. paludicola*; Stanley in Stanley & E.M.Ross, *Fl. SE Queensl.* 2: 510, Fig. 71F (1986); E. Salkin et al., *Austral. Brachyscomes* 46 (1995). — **Type citation:** "In planitiebus basalticis a tractu Peak Range usque ad prata Darling's Downs." **Lectotypification:** "Peak Downs, Brisbane River, 12.1856, *F. Mueller* (MEL)" (p. 173) and "Peak Downs, 12.1856, *F. Mueller* (MEL, lectotype, lectoparatypes)" (Davis 1948, p. 174; see note below). **Lectotype:** MEL 1556207 (p.p., as to specimen on left-hand-side as designated by Davis and including an envelope marked "Fruit removed from lectotype from head material marked 'x', G.L.D."). **Isolotypes:** K 000882185, K 000882186, MEL 1556207 p.p. (i.e. remaining specimens on sheet with lectotype), TCD. **Presumed isotype:** East Australia, *F. Mueller* (MEL 658090), see below.

Perennial, stoloniferous herb, branches ascending to erect, to c. 60 cm long, glabrous or with shortly stalked glandular hairs and these on the lower part of the branches. Leaves entire or rarely some basal ones with several teeth, narrowly elliptic, obovate to oblanceolate or lanceolate 1–7.5 cm long, 0.1–1.4 cm wide, apically obtuse to acute, glabrous or basal leaves with shortly stalked glandular hairs as on main axes, sometimes glaucous, the largest leaves often with 2 major lateral veins. Involucre c. 5–8 mm diam. Bracts 20–32, in 1 or c. 2 rows of about equal length, mostly narrowly elliptic, oblanceolate or sublinear, more rarely elliptic, 1.8–3.5 mm long, 0.4–0.9 mm wide, herbaceous but with scarious margins, apices mostly acute to acuminate, glabrous or sometimes with a few, minute, shortly-stalked glandular hairs. Receptacle subconical, subalveolate, glabrous. Ray florets c. 27; corolla 6.8–7 mm long, not obviously lobed or 3-lobed, usually with 4 veins, white. Disc florets c. 100, 1.6–2.2 mm long, 5-lobed, yellow. Stamens 5; anthers with the microsporangium c. 0.9 mm long, each with a sterile apical appendage c. 0.15 mm long; endothelial tissue with radial thickening. Style with the apical appendages triangular to narrowly triangular and longer than the stigmatic part. Cypselas monomorphic, obovoid or rarely broadly obovoid, manifestly swollen, 1.2–1.6 mm long, 0.5–0.8 mm wide, uniformly brown; lateral surfaces of fruit body and ab/adaxial margins conspicuously tuberculate and margins not well-defined; eglandular hairs absent or minute and curved, some



glandular hairs present; pericarp with 2 vascular bundles; carpodium present. *Pappus* a small uneven crown c. 0.1 mm high, the individual cells often swollen and yellowish. *Chromosome number*:  $n = 8$ . **Fig. 1C.**

*Distribution.* Confined to Queensland, south of c. 22°S (Rockhampton region) to the New South Wales border, and east of c. 147°E.

*Habitat.* In his original description Mueller referred to the species as coming from basalt plains from the Peak Range to near the Darling Downs. The only reference to basalt in modern collections is that by V.J. Neldner & M.B. Thomas 697A who recorded “*Eucalyptus laevopinea* tall open forest on basalt dome”. Most other collections indicate that *B. basaltica* generally occurs on clay soil in areas subject to flooding, including both eucalypt forest and *Melaleuca* woodland.

*Phenology and reproductive biology.* Collectors’ notes suggest that this species commonly flowers from August to November but there are flowering specimens collected in May and June.

A single pollen:ovule ratio 3,104 was determined from *A. Rodd* 3219; the capitulum had 27 ray and 113 disc florets.

Salkin et al. (1995) recorded that seed germinates poorly in 15–40 days.

*Cytology.* Both Smith-White et al. (1970, Fig. 28 & 43) and Watanabe et al. (1996b) determined a haploid chromosome number of  $n = 8$  for this species. In both cases the determinations and the idiogram of somatic metaphase chromosomes published by Watanabe et al. (1996a, Fig. 20) and Watanabe et al. (1999, Fig. 46) were for specimens gathered in the vicinity of Millmerran, Queensland.

*Typification.* As is typical with many of Mueller’s descriptions there is some discrepancy between the published specimen data and that recorded on original labels accompanying what must be the type specimen. In the case of the type of *B. basaltica* Mueller’s original label has “*Brachycome/Folia glauca/Radius albus/Brisbane River/ Dec. 1856/Ferd. Mueller*”. The specific name “*basaltica* Ferd. Mueller” and the location “Peak Downs” were added, seemingly also in Mueller’s hand, at a later date, suggesting that the type either came from Brisbane River or was collected somewhere between Brisbane River and Peak Downs. The presumed islectotype referred to above was housed for some years in the MEL reference collection; it is assumed to have been taken from Mueller’s type collection.

The fruit accompanying the lectotype and islectotype specimens at K are somewhat variable; when I examined them during a visit in 2005 I noted “brown, mature fruit more swollen and shorter than immature yellow-brown fruit, which is a bit disconcerting. Presumably from different capitula; several plants possibly represented on the sheets”. As recorded when discussing the distribution of *B. paludicola* and the typification

of *B. basaltica* var. *gracilis* (see under the former species) some early collections of what I here refer to *B. basaltica* and *B. paludicola* appear to have been confused and erroneously labelled at MEL before they were sent to K for study by Bentham. Thus, it is possible that the differences in fruit characters observed in the lectotype at MEL and the islectotype specimens of *B. basaltica* at K may not be due to differences in maturity or variation between plants of the one taxon but due to a mixing of fruit from different species; they need to be re-examined with this possibility in mind.

*Notes.* I am unfamiliar with this taxon in the field and my circumscription may prove to be too broad. There are a few collections which are of somewhat distinctive entities. For example, I.R. Telford 1684 from a rocky coastal headland at Mulambin Beach (Yeppoon-Emu Park), has a pappus ring which is whitish (not yellowish) and the somewhat swollen cells are more divided than in other specimens. However, at least in W.J. Bisset S570, the pappus rim is slightly divided, albeit not white. The specimen I.R. Telford 1684 is also distinctive in that it has a more sprawling habit and has not developed the longer and narrower cauline leaves found in most other specimens; this may reflect the presumably exposed habitat in which it was growing. There is also variation in leaf colour between specimens, with many having green leaves but others, such as the type specimen, being markedly glaucous. Furthermore, the lowermost leaves in many specimens have stalked glandular hairs but, in some, glandular hairs are absent; it is here assumed that the first-formed, glandular-hairy leaves are lost with age or lose their hairs with maturity.

Immature fruit are strongly laterally compressed and smooth but become markedly swollen and tuberculate at maturity. Minute, biseriate, barely curved eglandular hairs are visible on the immature fruit of some collections.

#### *Selected specimens examined.*

QUEENSLAND: Gatton College, Oct. 1906, J.F. Bailey (BRI 330543); Lawes, 4 Sept. 1948, W.J. Bisset S570 (CANB); Boonah, 6 Nov. 1934, Rev. N. Michael (BRI 331025); Rockhampton, 30 Aug. 1976, A. Rodd 3219 (MEL, NSW); 4km NE of Millmerran on Toowoomba road, 29 Sept. 1992, K. Watanabe 25 et al. (BRI, CANB, MEL, TI).

#### **7. *Brachyscome paludicola* P.S.Short, sp. nov.**

**Type:** Victoria. Murray River. Barmah Forest, at Brown’s Camp. 35°52’S, 145°17’E, on hard, dry clay in River Red Gum forest, 28 Oct. 1982, H.I. Aston 2336 (**holotype**: MEL 616729; **isotypes**: BRI 295507, K).

*Brachyscome basaltica* var. *gracilis* Benth., Fl. Austral. 3: 515 (1867) (“*Brachycome*”); J.M.Black, Fl. S. Austral. 1st ed., 583 (1929) (“*Brachycome*”), p.p., excl. Queensland ref.; G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 174. Fig. 36, pl. vi (1948) (“*Brachycome*”); E.L. Robertson, J.M.Black’s Fl. S. Austral. 853, Fig. 1152H (1965, rev. edn) (“*Brachycome*”); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1448, Fig. 654A (1986) (“*Brachycome*”); G.M.Cunningham et al., Pl. W. New South Wales 649, Fig. 64h (1981) (“*Brachycome*”);

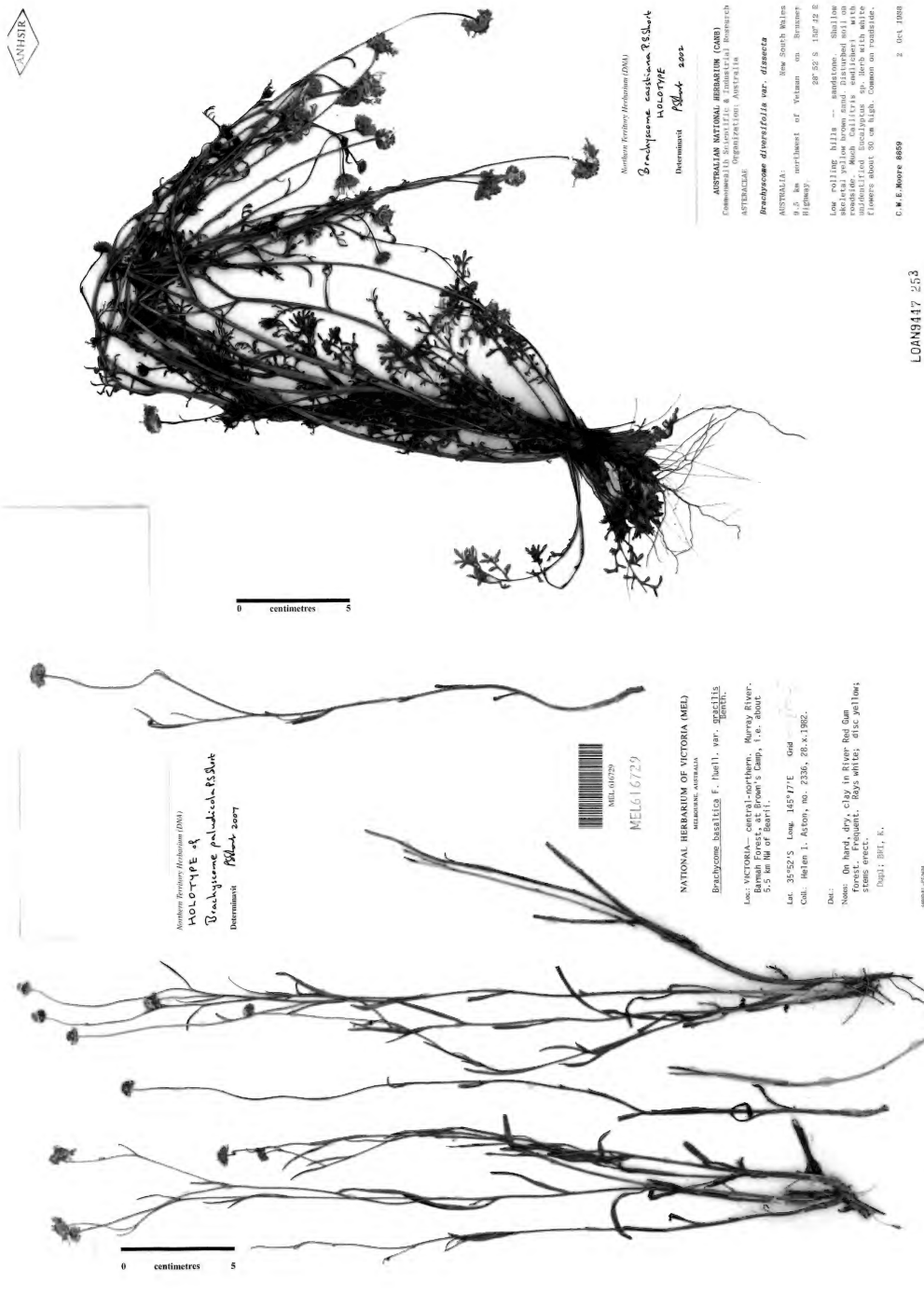


Fig. 15. Holotype of *Brachyscome paludicola* (MEL), H.I. Aston 2336.

Fig. 16. Holotype of *Brachyscome cassiana* (CANB), C.W.E. Moore 8859.

J. Everett in G.J. Harden, Fl. New South Wales 3: 157 (1992) ("*Brachycome*"); E. Salkin et al., Austral. Brachycomes 48 (1995); P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 841, Fig. 169f (1999). — **Type citation**: "Queensland. Rockhampton and Keppel Bay, Thozet. N. S. Wales. Macquarrie [sic] marshes, Mitchell; Murray and Darling rivers, Dallachy. S. Australia. Tamunda [sic] on the Gawler River. F. Mueller." **Lectotypification**: "Lectotype: Keppel Bay, Thozet (MEL)." **Lectoparatypes**: Twelve, Keppel Bay, Thozet (MEL)." (Davis 1948, p. 174, Fig. 36). **Lectotype**: Keppel Bay, [A.] Thozet (MEL 1556209 p.p., as to single plant annotated by Davis as lectotype and including the packet marked "Fruit removed from head of specimen marked x"). **Isolectotypes**: K 000882180; MEL 1556209 p.p. (as to elements annotated by Davis as "paratypes" and including an envelope of plant matter attached to the top of the sheet), MEL 220859, MEL 220860, NSW 15283. **Remaining syntypes**: Keppel Bay, [A.] Thozet (MEL 220861 & MEL 220862, the former marked as being seen by Benthams and the latter a presumed duplicate; both are of *B. basaltica*); Murray and Darling rivers, J. Dallachy (K 000882182, MEL 692288); Macquarrie Marshes, fl white, 16 Feb. 1846, T.L. Mitchell 46 (K 000882183/000882184; appears to me that all elements on this sheet may be of the same collection but treated as two collections by K); ad fluvium Gawler apud Tanunda, 15 Apr. 1848, F. Mueller (MEL 220879, not annotated as being seen by Benthams, originally annotated as *Paquerina graminea* by Mueller and determined as *B. angustifolia* by Davis but clearly of this taxon and the locality is in agreement with the protologue). **Possible remaining syntype**: Murray River, Anon. (MEL 220967, seen by Benthams but only has the name "Brachycome graminea" in Mueller's hand and Benthams, Fl. Austral. 3: 514 cited specimens of that species "from the Murray to St. Vincent's Gulf, F. Mueller and others"). **Excluded syntype**: Rockhampton, "Herb. F. Muell." (K 000882181), being of *B. basaltica*; Keppel Bay, [A.] Thozet (MEL 220861, MEL 220862; the former specimen marked as being seen by Benthams and the latter a presumed duplicate; both are of *B. basaltica*).

Perennial, stoloniferous herb, branches ascending to erect, to c. 60 cm long, glabrous or sometimes with a few, shortly-stalked, glandular hairs. Leaves cauline, entire, linear or almost so or narrowly elliptic, 20–85 mm long, 0.7–5 mm wide, glabrous. Involucre 5–10 mm diam. Bracts 12–20, in c. 1 or 2 rows and about equal in length, obovate to oblanceolate or somewhat elliptic, 2.3–3.7 mm long, 0.9–2.3 mm wide, mainly herbaceous but with scarious margins which may be purplish, outer surface glabrous or with a few stalked glandular hairs. Receptacle subconical, alveolate, glabrous. Ray florets 17–50; corolla 5.7–9 mm long, not obviously lobed, with 3, 4 or 5 veins, white but yellowish on drying, sometimes pinkish on undersurface. Disc florets 65–110, corolla 1.8–2.4 mm long, yellow, 5-lobed. Stamens 5; anthers c. 1.1–1.3 mm long; microsporangium 0.9–1.1 mm long, apical appendage c. 0.2 mm long. Style arms c. 0.8 mm long, the apical appendages triangular, 0.35–0.4 mm long and equalling or longer than the stigmatic part. Cypselas obovoid, 1.1–2.6 mm long, 0.5–1.35 mm wide, with two, non-swollen ridges on each lateral

surface, uniformly brown; lateral surfaces of fruit body conspicuously tuberculate, tubercles 17–74 per face and usually distinct from each other but sometimes with a few together, with some glandular hairs and minute, curved, biseriate eglandular hairs usually present; ad/abaxial ribs smooth or almost so; pericarp with 2 vascular bundles; testa cells with u-shaped thickening (H.I. Aston 2336); carpodium present. Pappus absent or perhaps represented by a small, even or microscopically toothed ring c. 0.1 mm high. Chromosome number:  $n = 6$ . **Fig. 1D, 15.**

**Distribution.** Found in New South Wales, Victoria and South Australia, the species can be broadly considered to follow the drainage basin of the River Murray and its tributaries, including the Macquarie and Lachlan rivers in eastern New South Wales. However, it is also found in swampy flats and grasslands in southern Victoria, e.g. at Taylors Lake near Sydenham.

Davis (1948) accepted the disjunction between specimens of var. *gracilis*, which both she and Benthams (1867) recorded as coming from Queensland – including the lectotype specimen from Keppel Bay attributed to Thozet and chosen by Davis (1948) – and those from other States. However, there is evidence, other than the disjunct distribution, that specimens of this species recorded as being from Queensland have been erroneously labelled during their incorporation into the National Herbarium of Victoria (MEL) soon after their collection and before they were examined by Benthams (1867); additional mixing of collections at MEL may also have subsequently occurred during the time unmounted specimens were held in taxon folders. The evidence for this is as follows: none of the labels accompanying the lectotype specimen of *B. basaltica* var. *gracilis* and any other specimens of *B. basaltica* var. *basaltica* and var. *gracilis* attributed to Thozet have original collector's labels; vegetatively the upper leaves and branches of both this species and *B. basaltica* are morphologically similar and without recourse to examination of bracts and fruit can be easily misinterpreted as belonging to either taxon; collections attributed to Thozet, all undated and simply labelled as coming from Keppel Bay, of both *B. basaltica* s.str. (MEL 220861 & MEL 220862) and *B. basaltica* var. *gracilis* (lectotype and isolectotypes) exist in MEL and were seen by Benthams; all Queensland collections previously attributed to *B. paludicola* (i.e. var. *gracilis*) are either of *B. basaltica* [i.e. a syntype specimen of var. *gracilis* from Rockhampton ("Herb. F. Muell.", K 000882181, cited by Benthams (1867) and a Leichhardt collection from Head Station, Wide Bay cited by Davis (1948, p. 174)] or are mixed collections held at MEL [i.e. Anon., Fitzroy River below Rockhampton (MEL 692260) and a collection (MEL 220844) from Cunninghams Gap from the herbarium of H.B. Williamson and this stated to be a duplicate of a collection gathered by F.M. Bailey, the original specimen in BRI consists only of *B. basaltica*]; and no recent specimens of *B. paludicola* from Queensland

have been seen. Intriguingly, Mueller's manuscript species' name and handwritten description are attached to MEL 220860. Perhaps doubt about the accuracy of the locality explains why Mueller never published this name, something he was usually not shy of doing.

**Habitat.** Occurs on inundated clay soils and common in seasonally wet, red gum-dominated flats.

**Phenology and reproductive biology.** Flowering is commonly from September to January but has been recorded for other months.

A pollen:ovule ratio of 2,214 was determined for a capitulum from *P.S. Short* 3922; it had 50 ray and 112 disc florets.

**Cytology.** Under the name of *B. basaltica* var. *gracilis* a haploid chromosome number of  $n = 6$  has been recorded for populations at Booligal, Menindee and Nyngan in New South Wales and from Apsley, Bearii, Barmah State Park and Taylors Lake in Victoria (Smith-White et al. 1970, no voucher specimens seen; Watanabe & Short 1992; Watanabe et al. 1996b). Watanabe et al. (1996a, Fig. 50) and Watanabe et al. (1999, Fig. 50) have published an idiogram of somatic metaphase chromosomes of this species.

**Typification.** As recorded under notes on distribution the lectotype specimen of *B. basaltica* var. *gracilis* chosen by Davis (1948) is almost certainly mislabelled, not coming from Keppel Bay and perhaps not even collected by Thozet.

**Etymology.** The specific epithet is in reference to the seasonally swampy ground in which the species grows.

**Notes.** With the name *B. gracilis* G.L.R.Davis already in use and with an apparent mislabelling of the type specimen of *B. basaltica* var. *gracilis* I opted to describe this taxon at species level with a new name.

*Brachyscome paludicola* differs from *B. rara* in being a perennial, not an annual herb and differs from *B. basaltica* in having entire, linear or narrowly elliptic leaves 0.7–5 mm wide and in the cypselas being somewhat laterally flattened and usually having distinct longitudinal ridges. It also differs from *B. basaltica* in having a haploid chromosome number of six, not eight.

Bentham, when describing *B. basaltica* var. *gracilis*, briefly described the taxon as "More slender [than var. *basaltica*], 1 to 2 ft. high. Leaves all linear or linear-lanceolate." He appears to have viewed variation in fruit morphology as a result of differences in maturation. It is otherwise difficult to believe that he considered the two taxa to be of the same species although Davis (1948) too retained the varietal rank. Smith-White et al. (1970) subsequently demonstrated that it is a distinct species.

The curved, biseriate eglandular hairs on the fruit are minute and always seem to terminate a tubercle. They may be absent from some fruit and are best observed in immature fruit at  $\times 100$  magnification.

The apex of the cypselas is crowned by a small ring which appears to be nothing more than the region of

dehiscence between the fruit and the corolla. The rim is entire or sometimes slightly uneven and tooth-like (e.g. *C.R. Alcock* 10278).

There is considerable variation in the size and number of tubercles on the fruit and habit is also somewhat variable, plants being weakly ascending to somewhat rigidly erect. In isolation, some forms such as that found in Kinchega N.P. (*E.M. Canning* 4830, *E. Salkin* 117, *A.J.A. Sikkes* 333) with fruit 1.1–1.5 mm long, and others such as *A.C. Beauglehole* 66909 from near Goroke in western Victoria with fruit 2.3–2.6 mm long, are distinctive but measurements of fruit from 14 populations showed that intermediate sizes are common.

Specimens at PERTH and MEL indicate that the species was grown in the Botanic Gardens, Melbourne in the 19<sup>th</sup> century; one specimen is attributed to Ferdinand Mueller (MEL 220842).

#### *Selected specimens examined.*

**SOUTH AUSTRALIA:** Harbels Bend, 13 May 1973, *B. Copley* 4004 (AD); island in Loch Luna, 22 Nov. 1965, *Hj. Eichler* 18431 (AD, CANB); c. 5 km N of Wolseley, 6 Nov. 1964, *D.N. Kraehenbuehl* 1224 (AD); Mannum, 26 March 1961, *T.R.N. Lothian* 967 (AD); Piggy Flat Lagoon, 21 April 1979, *D.E. Symon* 11565 (AD, CANB, NSW).

**NEW SOUTH WALES:** 15 km from Booligal, 9 Oct. 1979, *E.M. Canning* 4588 (CBG, MEL); Terrigal Creek bird-viewing platform, Macquarie Marshes area, 15 Sept. 2000, *J.R. Hosking* 1884 (DNA); S bank of the Lachlan R. near Norwood Homestead, 14 Oct. 1972, *N.S. Lander* 200 (MEL, NSW); 5 km NW of Menindee along banks of Darling River, 29 Oct. 1972, *A.J.A. Sikkes* 333 & *I.R. Telford* (CBG); Muggabak Creek, 14 km N of Booligal on Cobb Hwy, 6 Oct. 1992, *K. Watanabe* 76 et al. (MEL, NSW, TI).

**VICTORIA:** Taylors Lakes, c. 2 km SE of Sydenham, 12 Jan. 1986, *D.E. Albrecht* 2719 (CANB n.v., MEL); 19 km W of Goroke, 29 Nov. 1979, *A.C. Beauglehole* 66909 (MEL); Tragowel Swamp, 28 Dec. 1985, *A.C. Beauglehole* 83080 (MEL); 4.2 km NW of Bearii, 14 Nov. 1988, *P.S. Short* 3358 (MEL); c. 20 km N of Apsley, 25 Oct. 1993, *K. Watanabe* 222 (CANB, MEL, TI).

#### **8. *Brachyscome rara* G.L.R.Davis**

Proc. Linn. Soc. New South Wales 79: 204, Fig. 5–8 (1955) ("*Brachyscome*"; *P.S. Short*, J. Adelaide Bot. Gard. 13: 63 (1990); *E. Salkin* et al. Austral. Brachyscomes 197 (1995).

— **Type citation:** "*Holotype:* Floodwaters of the Wilson River, western Queensland, 9.1922, W. MacGillivray. (WAI. 8118.). *Paratypes:* Two. *Loc. cit.* (WAI. 8140.)."

**Holotype:** AD 98930057 (formerly ADW 8118 & ex herb. Albert Morris). **Isotypes:** AD 98674106 (formerly ADW 8118 & ex herb. Albert Morris); AD 97626128 (ex herb. J.M.Black, p.p., see below).

*Brachyscome coongiensis* Munir, J. Adelaide Bot. Gard. 11: 53, Fig. 1 (1988) ("*Brachyscome*"). — **Type citation:** "Type: *J. Reid* 1183, Coongie, Lake Eyre Basin, 27°10'S, 140°09'E, South Australia, 1.ix.1987 (AD, holotype; AD, BRI, MEL, NSW – isotypes)." **Holotype:** AD 98742084. **Isotypes:** AD 98749193, BRI 418002, MEL 696222, NSW 229974.

[*Brachyscome basaltica* auct. non F. Muell.: J.M.Black, Fl. S. Austral. 1st ed., 583, Fig. 246F (1929), as to AD 97626128 (ex herb. J.M.Black) but excluding var. *gracilis* Benth.]

Annual *herb*, branches ascending to erect, to c. 40 cm long, glabrous or with an indumentum of stalked glandular hairs less than c. 0.1 mm long. *Leaves* cauline, entire but the margins sometimes appearing somewhat undulate, basal leaves commonly oblanceolate or linear-ob lanceolate and tapering to the base, 30–50 mm long, 3–14 mm wide, the mid to upper cauline leaves ovate to lanceolate and basally stem-clasping, 8–45 mm long, 2.5–14 mm wide, glabrous or with shortly stalked hairs. *Involucre* c. 5–7 mm diam. *Bracts* c. 10–22, in more or less 1 row and mostly about equal in length, obovate, 3.5–5 mm long, 1.1–2 mm wide, mainly herbaceous but with scarious margins, outer surface glabrous or with few to many stalked glandular hairs. *Receptacle* rounded to subconical, alveolate, glabrous. *Ray florets* 24–42; corolla c. 4–6.6 mm long, not obviously lobed, with 4, or 5 veins, white or pale mauve. *Disc florets* to c. 150, corolla 1.7–2.3 mm long, yellow, 5-lobed. *Stamens* 5; anthers c. 1–1.3 mm long; microsporangium 0.85–1.1 mm long, endothelial tissue with radial thickening, each with a sterile apical appendage c. 0.2 mm long; filament collar straight in outline and basally not thicker than the filament. *Style* arms c. 0.7 mm long, the apical appendages triangular, c. 0.3 mm long and shorter than the stigmatic part. *Cypselas* monomorphic, widely obovoid to obovoid, 1.1–1.45 mm long, 0.7–1 mm wide, with two, non-swollen, smooth or uneven ridges on each lateral surface, uniformly brown or rarely dark green; lateral surfaces of fruit body conspicuously tuberculate, tubercles c. 7–20 per face and distinct or a few seemingly coalescing, with some glandular hairs and minute, curved, biserial eglanular hairs usually present; ad/abaxial ribs tuberculate; pericarp with 2 vascular bundles; testa cells with u-shaped thickening (Gillen/Reid 852); carpodium present. *Pappus* absent or represented by a toothed ring c. 0.1 mm high. *Chromosome number*:  $n = 6$ . **Fig. 1E.**

*Distribution.* South-western Queensland and north-eastern South Australia. All localities appear to fall within the Cooper River drainage basin.

*Habitat.* Grows in the cracking clay of floodplains with mostly ephemeral herbs and grasses and chenopod shrubs. Also recorded from a *Muehlenbeckia cunninghamii* association.

*Reproductive biology.* A pollen:ovule ratio of 3,530 was determined for a specimen of *J. Reid 1142*; the capitulum examined had 42 ray and 146 disc florets.

*Cytology.* Watanabe & Short (1992, Fig. 1D) recorded  $n = 6$  in a population coming from the margins of Lake Apachirie. Watanabe et al. (1999, Fig. 51) published an idiogram of the somatic metaphase chromosomes.

*Typification.* The holotype specimen of *B. rara* is annotated as in the protologue, i.e. “Floodwaters of the Wilson River”, while the isotype specimen seen by Davis and annotated by her as “paratypes” (used by her in today’s sense of isotypes) is simply labelled as

“Wilson River”. With both specimens also annotated as having been collected in September 1922 by Dr. William MacGillivray Davis clearly regarded them as being from a single gathering, with the locality simply being abbreviated. Accepting that they are from the one gathering then probably all elements from J.M. Black’s herbarium collected by MacGillivray in September 1922 and mounted on AD 97626128 should be regarded as isotypes, despite one being labelled as “Wilson River (typica) / Sept 1922 / (Dr M’Gillivray)” and the other “Floodwaters of Wilson Riv. or [illegible] BHill & Cordillo Downs / Sept. 1922 / (Dr M’Gillivray)”; note that Black was using the word “typica” on this sheet to indicate that he believed these specimens and another collected by R. Cockburn to be typical of *B. basaltica* s.str., not in reference to the status of the specimens as types of *B. rara*. The discrepancy in labels and the positioning of the afore-mentioned specimens on the sheet does suggest that Black did not receive them at the same time and does cast some doubt as to both being part of a single gathering. However, we do not know how Black received and handled the specimens; nor for that matter do we know about the receipt and handling of the type specimens (holo- & isotype), which were once in the Waite Agricultural Institute and, before that, part of Albert Morris’s herbarium. Importantly, there is no doubt that they are representative of a single taxon, *B. rara*, and – although not without some reservation – I have designated the specimens in Black’s herbarium as isotypes.

*Notes.* Undoubtedly closest to, and most likely to be confused with, *B. paludicola*. Unlike that species it is apparently an annual herb and has leaves which are often manifestly ovate to lanceolate and slightly stem-clasping at the base; the leaves are also generally less rigid. Cypselas are similar to those of *B. paludicola* but have tuberculate margins and generally fewer tubercles on the lateral surfaces.

#### *Additional specimens examined.*

QUEENSLAND: Coopers Creek near “Dig Tree”, nr Nappa Merrie Hmsd, 15 Aug. 1964, *H. Doing* (CANB 150227).

SOUTH AUSTRALIA: Coongie Lakes area, channel leading into Lake Apachirie, 18 Oct. 1983, *L. Alexander 2420* (AD); between Goyders’ Lagoon & Qld border, June 1916, *R. Cockburn* (AD 97626128, ex herb. Black); Cooper Creek delta into Coongie Lake, 14 Oct. 1986, *P.E. Conrick 1890* (AD); Innamincka Stn, 4 Nov. 1987, *P.E. Conrick 2255* (AD); Lake Apachirie, 18 May 1987, *Gillen/Reid 852* (AD); Coongie Lakes, 25 Jan. 1987, *C. O’Malley 229* (AD); Coongie, flood-out of Lake Tootoowarania, 20 April 1987, *J. Reid 712* (AD); 2 km S of Coongie, 15 Sept. 1987, *J. Reid 1142* (AD, DNA); Embarka Swamp, 11 Sept. 1987, *J. Reid 1147* (AD); Tirrawirra Swamp, 17 July 1987, *J. Reid 1178* (AD); 15 km SSE Coongie, 16 Aug. 1988, *J. Reid 1689* (AD).

#### *Brachystephium group*

*Brachystephium* Less., Syn. Gen. Compos. 388 (1832). — *Brachyscome* sect. *Brachystephium* (Less.) Benth., Fl. Austral. 3: 509 (5 Jan. 1867) (“*Brachyscome*”), p.p. —

*Bellis* sect. *Brachystephium* (Less.) Kuntze in T.Poist & Kuntze, Lex. Gen. Phan., Prosp. 164 (Dec. 1903). — **Type:** *Brachystephium leucanthemoides* Less., Syn. Gen. Compos. 389 (1832), nom. illeg. [= *B. diversifolium* (Graham ex Hook.) Fischer & C.Meyer]

*Brachyscome* subgenus *Eubrachscome* “superspecies *diversifolia*” G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 148, 150, 199 (1948) (“*Brachyscome*”), excluding *B. eriogona*.

*Brachyscome diversifolia* group: P.S.Short in N.G.Walsh & Entwistle, Fl. Victoria 4: 844 (1999).

**Herbs**, annual or perennial, rarely stoloniferous, glabrous or with a sparse to prominent indumentum of long, septate, eglandular hairs; stalked glandular hairs absent or present and sometimes common. **Leaves** with at least the upper cauline ones commonly and usually obviously dilated in the lower  $\frac{1}{3}$ – $\frac{1}{2}$ , barely dilated in *B. segmentosa*. **Terminal anther appendage** present. **Cypselas** monomorphic or slightly heteromorphic, straight to manifestly curved along their length, all with 2 apically joined ridges on each lateral surface, the ridges swollen throughout their length or at least towards and at the apex, always tuberculate between the ridges and if the ridges poorly formed or appearing to coalesce the tubercles still present; carpodium absent, the base peg-like. **Pappus** of short erect or spreading bristles 0.2–1 mm long. **Chromosome numbers:**  $n = 3, 4, 5, 12, 16, 18, 20$ .

**Cytology.** Chromosomally variable, a count of  $n = 18$  for a variant of *B. diversifolium* suggesting an original base number of  $x = 9$ , a common base for many genera of Astereae, with determinations of  $n = 12, 16$  and  $20$  being the result of polyploidy based on lower numbers.

**Reproductive biology.** Of the seven species here recognised all but one have conspicuous capitula and pollen:ovule ratios of several thousand, characteristics indicative of a high degree of cross-pollination. The exception, *B. goniocarpa*, has relatively inconspicuous ray corolla, 4-lobed disc corolla and pollen:ovule ratios of several hundred, features indicative of a high level of self-pollination.

**Notes.** This group is generally equivalent to Davis’s (1948) “superspecies *diversifolia*”, which as defined in her “Key to the Superspecies” included those species with

Fruit narrow to broad-cuneate, with smooth or tuberculate horseshoe-shaped lateral folds. Pappus conspicuous, obliquely placed (except in *B. readeri*) and often stellate. Leaves cauline.

Davis (1948), p. 148

As here, emphasis was given to the fruit structure, the “horseshoe-shaped lateral folds” being equivalent to the apically-joined, longitudinal ridges on the lateral surfaces of the fruit mentioned in the above description. Davis recognised five species in this group, i.e. *B. diversifolia*, *B. goniocarpa*, *B. readeri*, *B. segmentosa* and *B. eriogona*. She only saw type specimens of *B. eriogona* which were “in a bad state of preservation”

and had fruit which were not fully mature. Otherwise, I feel sure that Davis would have noted its affinity with *B. lineariloba* and *B. campylocarpa* and excluded it from this superspecies; I here place it with the aforementioned species in the *B. lineariloba* group.

As will be evident from the above literature citation, if this group is to be given generic status the name *Brachystephium* is available. It is only uncertainty as to the final circumscription of the group, which has prevented me from reinstating the name; I have no doubt that it is distinct from *Brachyscome* s.str.

Morphologically, the affinities of the group appear to be with the *B. lineariloba* group and the genus *Roebuckia*, members of these groups having one or two swollen lateral surfaces on their cypselas, the presence or absence of which united them in unpublished cladistic analyses of morphological and anatomical data. Another feature suggesting a close relationship is the absence of a distinct carpodium at the base of the fruit in most of the taxa here placed in these groups. As further discussed in the account of the *B. lineariloba* group both it and the *Brachystephium* group appear, on morphological and cytological grounds, to be very closely related. They are also primarily distributed in eastern Australia whereas, with one exception, all species of *Roebuckia* occur in Western Australia.

Note that there are some specimens (e.g. in NSW) which I have determined as belonging to the genus *Brachystephium*, these being returned to their respective institutions before I had finalised this review. Should any determinations be reflective of new combinations by me in *Brachystephium* then they are unpublished and accordingly absent from this review.

#### 9. *Brachyscome castiana* P.S.Short, sp. nov.

**Type:** New South Wales. 9.5 km north-west of Yetman on Bruxner Highway (28°52'S, 150°42'E). 2 Oct. 1988. C.W.E. Moore 8859 (**holotype:** CANB 387426; **isotype:** NSW 229544).

*Brachyscome diversifolia* var. *dissecta* G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 202, Fig. 70, pl. vi, map 22 (1948) (“*Brachyscome*”), (excluding specimens cited from N.S.W.); Stanley in Stanley & E.M. Ross, Fl. SE Queensl. 2: 511, Fig. 71J (1986); J.Everett, in G.J.Harden, Fl. New South Wales 3: 160 (1992) (“*Brachyscome*”), p.p.; E.Salkin et al., Austral. Brachyscomes 103 (1995). — **Type citation:** “*Holotype:* Darling Downs, Bybera, ‘sandy soil’, 20.1.1936, C.T. White, n. 9703 (BRI). *Paratypes:* Two, l.c. (NSW, MEL).” **Holotype:** BRI 226213. **Isotypes:** MEL 220768, NSW 15441.

Annual herb; major axes ascending to erect, to c. 45 cm tall, weakly striated, with an indumentum of scattered, eglandular septate hairs c. 1–2 mm long, and shortly stalked glandular hairs less than 0.1 mm long, the glandular indumentum often dense. **Leaves** basal and cauline, 0.5–11 cm long, at least the largest leaves 2- and even 3-pinnatisect but the mid to upper leaves more commonly 1-pinnatisect and the uppermost cauline leaves entire, all leaves usually conspicuously dilated towards the base, glabrous or with some

scattered eglandular and glandular hairs as found on the major axes, the uppermost leaf usually with a scarious apex. *Peduncles* commonly longer than the uppermost cauline leaves, with a dense indumentum of shortly stalked glandular hairs. *Involucre* c. 6–15 mm diam. *Bracts* 12–19 in about 2 rows, of about equal length, elliptic, oblong, ovate or obovate to oblanceolate, 3.4–4.8 mm long, 1–2.6 mm wide, mainly green but with scarious margins, the outer surface superficially appearing glabrous but usually with a moderate to dense indumentum of very shortly stalked glandular hairs and with glandular hairs also on the scarious margins. *Receptacle* hemispherical, areolate, glabrous. *Ray florets* c. 20–30; corolla 10.2–10.7 mm long, 1.8–2.1 mm wide, 3-lobed, with 4 (5) veins, white. *Disc florets* c. 100–200; corolla 2.1–2.6 mm long, yellow. *Stamens* 5; anthers 1.25–1.4 mm long, microsporangia 0.9–1 mm long, apical appendages 0.35–0.44 mm long, filament collar somewhat straight in outline and basally not thicker than the filament. *Style* 2.5–2.9 mm long, branches 0.75–1 mm long, sterile appendages triangular, about the length of the stigmatic portion. *Cypselas* obovoid (ab/adaxial view), distinctly curved (particularly those of the ray) to almost straight (lateral view), 1.7–2.7 mm long, the lateral surfaces with two indistinct swollen ridges which may appear as one ridge, the lateral surfaces (including the ridges) smooth or sometimes very slightly tuberculate, the entire fruit pale yellow-brown, the mature fruit glabrous but immature fruit with scattered eglandular, non-bifid, slightly curved hairs, glandular hairs absent; pericarp with 2 vascular bundles; carpopodium lacking, the fruit with a peg-like base. *Pappus* bristles 15–20, 0.2–0.5 mm long, erect, white. *Chromosome number*: unknown. **Fig. 1F, 16.**

**Distribution.** Restricted to the vicinity of Inglewood (southern Queensland) and the vicinity of Yetman (northern New South Wales).

**Habitat.** Apparently restricted to sandy soil in *Callitris*-dominated or *Callitris*–*Eucalyptus*-dominated woodland.

**Reproductive biology.** A pollen:ovule ratio of 3,785 was estimated for a capitulum of *C.W.E. Moore 8859*, the capitulum having 23 ray and 205 disc florets.

**Cytology.** No data available. Voucher specimens show that chromosome numbers published under the name *Brachyscome diversifolia* var. *dissecta* by Smith-White et al. (1970) pertain to *B. gracilis*.

**Etymology.** The epithet honours the authors and illustrator of *Australian brachyscomes* (Salkin et al. 1995), Esma Salkin, Gloria Thomlinson, Beth Armstrong, Bev Courtney and Maureen Schaumann, being derived from the first letter of their surnames. Judy Barker, editor of this excellent contribution to our knowledge of brachyscomes, is honoured elsewhere.

**Notes.** Cypselas within the one capitulum vary considerably in total size and the degree of curvature, the outer ones of the ray florets being generally much larger and more curved than those of the inner disc florets but are otherwise not dissimilar in their morphology.

This species is allied to *B. diversifolia* and was first recognised as a variety of that species, i.e. as var. *dissecta*, by Davis (1948), albeit that Davis's circumscription of the variety included forms which I retain within *B. diversifolia*. It differs from *B. diversifolia* in having involucre bracts less than 5 mm long and having manifestly curved cypselas; it differs from *B. gracilis* in the largest cypselas being 2.2–2.7 mm long, pale yellow-brown and the longitudinal ridges not forming a prominent shoulder.

In recognising this taxon as a distinct species it was possible to have made either a new combination or to have erected a nom. nov. However, the holotype specimen of var. *dissecta* only contains several mature or near-mature fruit and the isotypes consist of very poor material. I have therefore chosen to redescribe this taxon as a new species and in so doing have been able to choose better type material.

#### *Additional specimens examined.*

QUEENSLAND: Bybera, 3 Sept. 1934, *C.T. White 9814* (BRI); Bybera, 28 Sept. 1935, *C.T. White 10815* (BRI).

NEW SOUTH WALES: 15.1 km NW of Yetman, 23 Aug. 1987, *R.G. Coveny 12685* et al. (NSW n.v., MEL); "Lisgar", about 15 km S of Yetman, 22 Sept. 1988, *C.W.E. Moore 8731* (CANB); 9.5 km NW of Yetman, 2 Oct. 1988, *C.W.E. Moore 8859* (CANB, NSW); "Lisgar", 24 km S of Yetman, 4 Oct. 1990, *C.W.E. Moore 9145* (CANB); 3.8 km E of Yetman, 19 Oct. 1992, *C.W.E. Moore 9301* (CANB); 42 km from Yetman to Warialda, 24 June 1973, *B. Muffet M3/32* (CBG).

#### **10. *Brachyscome diversifolia* (Graham ex Hook.) Fischer & C.Meyer**

Index Sem. Hort. Petrop. 2: 31 (Dec. 1835) ("*Brachyscome*"); Benth., Fl. Austral. 3: 511 (1867) ("*Brachyscome*"); C.Moore, Handb. Fl. New South Wales 263 (1893) ("*Brachyscome*"); J.M.Black, Fl. S. Austral. 1st ed. 582, Fig. 246A (1929) ("*Brachyscome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 199 (1948) ("*Brachyscome*"), also see under vars, excl. var. *dissecta*; W.M.Curtis, Stud. Fl. Tasman. 297 (1963) ("*Brachyscome*"); E.L.Robertson, J.M.Black's Fl. S. Austral., 852, Fig. 1152 A (1965, rev. edn) ("*Brachyscome*"); J.H.Willis, Handb. Pl. Victoria 2: 671 (1973) ("*Brachyscome*"), p.p., excl. var. *dissecta*; P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 846, Fig. 171a (1999). — *Brachyscome diversifolia* var. *diversifolia*: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 199, Fig. 68, 77, pl. vi, map 22, pl. viii, 2 (1948) ("*Brachyscome*"); W.M.Curtis, Stud. Fl. Tasman. 297 (1963) ("*Brachyscome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1451, Fig. 655C, pl. 43 p.p. (1986) ("*Brachyscome*"); J.Everett in G.J.Harden, Fl. New South Wales 3: 160 (1992) ("*Brachyscome*"); E.Salkin et al., Austral. Brachyscomes 100 (1995). — *Pyrethrum diversifolium* Graham ex Hook., Exot. Fl. 3: t. 215 (June 1826). — *Brachystephium leucanthemoides* Less., Syn. Gen. Compos. 389 (1832), nom. illeg. (citing *P. diversifolium* as synonym). — **Type citation:** "cultivated



in the greenhouse both of the Botanic Gardens of Edinburgh and Glasgow, flowering in 1825 and 1826 in the month of May. The seeds were sent by Mr FRASER from New Holland who also sent me native dried specimens, which are not above half the size, either in stems, leaves or flowers, of the individual here figured." " **Syntypes**: Hort Gl./1826. E. Nov. Holl." (K); "... the banks of the Lachlan, [?observed] in flower in July", Fraser (K).

*Pyrethrum diversifolium* Graham, Edinburgh New Philos. J. 1826: 174 (Nov. 1826), nom. illeg., later homonym of *P. diversifolium* Hook. — **Type citation**: "The seeds were received from Mr Fraser, New Holland." **Type**: E?, possibly K; see note below.

*Steiroglossa humilis* DC., Prodr. 6: 39 (1838). — *Brachyscome diversifolia* var. *humilis* (DC.) Benth., Fl. Austral. 3: 511 (1867) ("Brachyscome"); C. Moore, Handb. Fl. New South Wales 263 (1893) ("Brachyscome"). — **Type citation**: "in humidis planitiebus ad Lachlan-river in Novâ-Cambriâ australi julio florentem legit cl. A. Cunningham ... (v.s. comm. à cl. inv.)." **Lectotype**: Wet plains, Lachlan River, N. S. Wales, July 1817, A. Cunningham (G-DC). (Davis 1948, p. 200, pl. viii no. 2). **Isolectotypes**: G-DC, K (2 sheets).

*Brachyscome diversifolia* var. *maritima* Benth., Fl. Austral. 3: 511 (1867) ("Brachyscome"); G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 201, Fig. 69, pl. vi, map 22 (1948) ("Brachyscome"); W.M. Curtis, Stud. Fl. Tasman. 297 (1963) ("Brachyscome"); E. Salkin et al., Austral. Brachyscomes 104 (1995). — **Type citation**: "Islands of Bass's Straits, R. Brown." **Holotype**: BM n.v. **Isotypes**: CANB 279080, E, K, MEL 220767.

Annual or perennial *herb*, very rarely stoloniferous or layering but probably never extensively scrambling and plants usually erect, branching at the base and sometimes above the base, the branches ascending to erect, to 50 cm long, with or without a scattered to prominent indumentum of septate eglandular hairs and/or stalked glandular hairs. *Leaves* basal and cauline, the largest leaves spatulate or narrowly obovate in outline, 1- or 2-pinnatilobed or pinnatisect, 2–10 (14) cm long, c. 0.5–2 cm wide, reducing in size towards the capitulum and the uppermost smallest and entire, at least the cauline leaves dilating towards the base and often manifestly dilated in the c. lower ½; leaf lobes (teeth) 5–46 in the largest leaves, narrow or broad. *Involucre* 11–18 mm diam. *Bracts* c. 20–30 in about 2 rows with the inner bracts shorter; largest bracts elliptic to narrowly elliptic or obovate to oblanceolate, 6.5–10.5 mm long, 1.5–4 mm wide, thin, mainly herbaceous but with hyaline margins and apices, apices sometimes purplish, externally with stalked glandular and/or septate eglandular hairs present, edges slightly denticulate with glandular hairs; inner bracts more hyaline, outer surfaces glabrous or with scattered hairs, the margins with stalked glandular hairs. *Receptacle* subconical, areolate, glabrous. *Ray florets* c. 21–37; corolla 10.8–13.3 mm long, white, with 4–8 veins, apically entire or very minutely 2- or 3-toothed. *Disc florets* c. 130–380; corolla tube yellow, 2.2–2.9 mm long, 5-lobed. *Stamens* 5; anthers 1.39–1.65 mm long, microsporangia 1.05–1.3 mm long, apical appendages 0.27–0.35 mm long. *Style* c. 1.9 mm long; style arms 0.79–1.12 mm long, the sterile appendages

triangular to narrowly triangular, 0.35–0.56 mm long and slightly shorter, equalling or slightly longer than the stigmatic portion. *Cypselas* essentially monomorphic, pale to dark brown or reddish brown, if pale brown then often with some purplish colouration at or near the apex, in lateral view straight or slightly curved, 1.5–2.7 mm long, 0.5–1.2 mm wide; lateral surfaces each with two, barely to distinctly prominent, longitudinal ridges, the ridges not or sometimes becoming very prominent at the apex of the fruit, the lateral surfaces of the fruit tuberculate between the ridges, the tubercles ending in short, straight or slightly curved, non-bifid eglandular hairs; ab/adaxial ribs smooth or almost so; testa with thin-walled cells (N.H. Scarlett 83/437); carpodium absent, the base peg-like. *Pappus* centred or sometimes slightly, asymmetrically placed of numerous somewhat spreading to erect bristles 0.3–1.0 mm long, white or very pale yellowish. *Chromosome number*:  $n = 12, 16, 18$ . **Fig. 1G.**

*Distribution*. Ranges from Tasmania north to the New England region of New South Wales, its distribution on the mainland mostly following the Great Dividing Range. In South Australia it is known from the lower south-east of the State and from the Mt Lofty Ranges, with a paucity of recent collections suggesting that in the Mt Lofty Ranges many populations have been lost through land clearance.

*Habitat*. Generally found in areas with an average annual rainfall of 500 mm or more. Commonly recorded from eucalypt woodland or forest but it has also been noted in other habitats, including coastal heath and, on Rum Island in Bass Strait, in a bird rookery, where it was recorded as growing with shrubs of *Atriplex* and *Lavatera*.

*Phenology and reproductive biology*. Flowering has been recorded from herbarium specimens for all months except July but principally October to December.

The large, showy capitula suggests that cross-pollination is likely and this is supported by determinations of pollen:ovule ratios ranging from 3,234 to 5,194, these being obtained from five capitula of *P.S. Short* 4152.

A few specimens, such as *M.D. Crisp* 6965 from a coastal headland near Portland in Victoria, exhibit stolons, or at least appear to layer. This is not a usual attribute and appears to be one found in plants growing in light, sandy soil.

*Cytology*. Chromosome numbers of  $n = 12$  and  $2n = 24$  have been recorded from the Grampians in western Victoria by Watanabe & Short (1992, Fig. 1G) and Watanabe et al. (1996b) while  $n = c. 20$  was recorded from the area by Smith-White et al. (1970). Smith-White et al. (1970) recorded  $n = 16$  for a population from Yetholme in New South Wales and  $n = 18$  and  $2n = 36 + 0$  or  $1B$  was determined from a population at Barrington Tops



in north-eastern New South Wales by Watanabe et al. (1996b).

An idiogram of somatic metaphase chromosomes of the entity with  $n = 12$  was published by Watanabe et al. (1999, Fig. 85).

*Nomenclatural notes and syntypes of Pyrethrum diversifolium.* William Hooker, when publishing this name, made it clear by stating “*Pyrethrum diversifolium*, Graham, MSS”, that he was adopting a manuscript name used by Professor Graham. Hooker’s description, which appeared in his *Exotic Flora*, was published in June 1826 (Stafleu & Cowan 1976–1988). Graham, in the same year, and in a paper entitled “List of rare plants which have flowered in the Royal Botanic Garden, Edinburgh, during the last three months; with descriptions of several new plants”, published the name, without reference to Hooker’s publication, in what is treated as the first volume of *The Edinburgh New Philosophical Journal*. The title page of the journal has the date “April...October 1826” and immediately beneath the title of Graham’s paper is the date “June 10. 1826”. Whether the latter date is the date of receipt or acceptance of the paper or the issue date of a preprint or fascicle of the journal is not clear and unsurprisingly Graham has sometimes (e.g. Steudel 1840; Black 1929) been considered to be the author of the name *Pyrethrum diversifolium*. However, as here, most botanists (e.g. Bentham 1863, Davis 1948) attribute authorship to Hooker and unless Graham’s paper was issued as a preprint this seems indisputable, with Chapman (1991) recording November 1826 as the publication date of the first volume of *The Edinburgh New Philosophical Journal*.

As Graham made no reference to Hooker’s publication I believe it obligatory to treat *P. diversifolium* Graham as an illegitimate name, being a later homonym of *P. diversifolia* Graham ex Hook. I visited E in 1992 but unfortunately have mislaid any notes regarding the presence or absence of authentic type material of the name *P. diversifolium* Graham at that herbarium. However, authentic type material may not be housed there. A visit to the JSTOR web-site ([plants.jstor.org/](http://plants.jstor.org/)) in August 2012 revealed that, in regard to this species, the only photographs of type specimens at E are of photographs of the sheets viewed by Hooker and housed at K.

The syntype specimens of *Pyrethrum diversifolium* Hook. at K are mounted on two sheets. The “Hort. Glasgow/1826” specimen is very poor, one capitulum having been destroyed by insects and the other mounted upside down. However, the latter capitulum did contain mature fruit. When examined by me I found the fruit to be very loose and likely to fall from the capitulum; I removed them and placed them in a packet which I annotated “Fruit from Hort. Glasgow specimen”. These pale brown fruit, with an obliquely placed pappus, are c. 2.2 mm long and the yellowish pappus bristles are c. 0.6–0.9 mm long. This specimen is mounted

with another plant, it being collected by Ronald Gunn from either Circular Head or Woolnorth in Tasmania; I found loose fruit in the folder and these are probably from both the Hort. Glasgow specimen and the Gunn specimen and I have placed them in a separate envelope. Another specimen, a single plant, is also on this same sheet; it has two labels, one attributing it to Cunningham and recording that it comes from the Lachlan River, another seemingly original label recording “*Matricaria / inundatis banks of L.R.*”. The annotations indicate that it is an islectotype of *Steiroglossa humilis*.

The other sheet at K which contains a syntype of *P. diversifolium* Hook. is mounted with a definite islectotype specimen, ex Heward, of *Steiroglossa humilis*, the type of which was collected by Allan Cunningham, not Charles Fraser, from banks of the Lachlan River. The latter collection is demarcated from other elements on the sheet by a pencilled line applied by a person unknown. However, although in general appearance all four elements (plants) above the line look very similar, I believe they belong to two separate collections, with both having Herbarium Hookerianum 1867 stamps placed next to them. What I consider to constitute a definite syntype specimen of *B. diversifolia* – undoubtedly being the “native dried specimens” referred to by Hooker – retains a label in Fraser’s hand recording “... the banks of the Lachlan, [?observed] in flower in July”. It consists of three elements which are mounted in a line across the sheet plus some loose fruit in an envelope removed from the left element. The second collection is of a single plant with a handwritten label “small ... humid flats L.R.”, the reference to humid flats being in accord with the protologue for *Steiroglossa humilis* and therefore indicating that it was part of Cunningham’s original gathering and not one by Fraser; this conclusion is also in accord with the annotation “*B. diversifolia* var. *humilis* / *Steiroglossa humilis* DC” and the printed “*Flora australiensis*, named by Mr. Bentham” label associated with it.

*Typification of B. diversifolia* var. *maritima*. From Vallance et al. (2001) it is evident that Brown’s collection of the type of var. *maritima* from the Kent Group was gathered in December 1803, coming from Deal Island or possibly Erith Island. Brown, as seen on MEL 220392, also collected this species elsewhere in Tasmania. It is simply labelled as coming from Van Diemen’s Land and does not match those from the Kent Group.

*Status and typification of Steiroglossa humilis.* The fact that *B. diversifolia* is highly polymorphic and contains a number of entities, together with the fact that the type specimen of *Steiroglossa humilis* is generally immature and has young fruit, has meant that I cannot unequivocally place it in synonymy under *B. diversifolia* s.str. However, this is where it was placed by Davis (1948) and I believe that this is likely to be correct, not just on morphological similarity, but because the dried

specimens of both *B. diversifolia* and *S. humilis* were presumably collected by Charles Fraser (*B. diversifolia*) and Allan Cunningham (*S. humilis*) on the same journey along the Lachlan River.

As noted above, isoelectotype specimens of *S. humilis* at K are on two sheets and are mounted with syntype specimens of *B. diversifolia*.

**Notes.** Davis (1948) recognised three varieties of *Brachyscome diversifolia*, i.e. var. *maritima* Benth., var. *dissecta* G.L.R.Davis, and the typical variety. I here recognise var. *dissecta* as a new species, *B. castiana*, and have chosen not to recognise var. *maritima*.

As recognised here, *B. diversifolium* is a polymorphic taxon, exhibiting variation in the branching of specimens (base only or also above the base), leaf morphology (1- or 2-pinnatilobed and in the shape of the resulting lobes), general indumentum, the size of the capitula and involucre bracts, and fruit morphology (including size, colour and the degree of development of the longitudinal ridges and tubercles on the lateral surfaces). As noted, there is also considerable variation in chromosome number. I have no doubt that some morphological entities, such as one centred around Barrington Tops with  $n = 18$  and represented by *P.S. Short 3981*, should be segregated, but have refrained from doing so as it is desirable that further studies be carried out to assess their circumscription and distribution.

In regards to the name var. *maritima*, based on a Brown collection from the Kent Group in Bass Strait, a combination of mostly 2-pinnatilobed leaves, large capitula, and fruit with prominent longitudinal ridges on the lateral faces does make it a reasonably distinctive entity. However, there is also considerable variation in the shape of leaf segments and the indumentum of the plants within the Bass Strait islands, let alone on the mainland. For example, *J.S. Whinray 293* from Craggy Island in the Furneaux Group has broad leaf segments and a general indumentum of long, septate hairs and stalked glandular hairs whereas others, such as *J.S. Whinray 705* from the Kent Group, have narrow leaf segments and a scattered indumentum only composed of stalked glandular hairs.

There are specimens in MEL which are annotated as having been cultivated in botanic gardens in Berlin (MEL 692463) and Leipzig (MEL 692462); both are undated but were seen by Bentham, indicating that they were grown in Germany prior to 1867.

#### *Selected specimens examined.*

**SOUTH AUSTRALIA:** Scott Creek C.P., 13 Nov. 1988, *R. Bates 16054* (AD); Forest Range, Mawson's property, 18 Nov. 1934, *C.M. Eardley* (AD 98669184); Lucindale, 27 Oct. 1934, *E.H. Ising* (AD 97411141).

**NEW SOUTH WALES:** Blackheath, Jan. 1932, *O.D. Evans* (SYD, 2 sheets); Jindabyne, Jan. 1899, *J.H. Maiden & W. Forsyth* (NSW 15420); Polblue picnic site, Barrington Tops State Forest, 1 Feb. 1993, *P.S. Short 3981* (AD, CANB, HO, MEL, NSW, TI).

**AUSTRALIAN CAPITAL TERRITORY:** Mt Majura, Casuarina Trail, 20 Dec. 1978, *T. Macartney-Snape 7* (CBG).

**VICTORIA:** Native Cat Track, East Gippsland, 10 Jan. 1971, *A.C. Beauglehole 35976* (MEL); Reeds Lookout, Grampians, 2 Nov. 1987, *M.G. Corrick 10265* (MEL); Treasures' Homestead, Dargo High Plains, 28 Jan. 1946, *J.H. Willis* (MEL 220806); Point Danger, 20 Nov. 1983, *C. & D. Woolcock 1368* (MEL).

**TASMANIA:** Rum Island, Furneaux Group, *S. Harris* (HO 103219); Little Dog Island, Furneaux Group, 5 April 1978, *J.S. Whinray 1206* (AD); Goose Island, Furneaux group, 15 Aug. 1972, *J.S. Whinray 1207* (MEL).

#### **11. *Brachyscome goniocarpa* Sond. & F.Muell. ex Sond.**

Linnaea 25: 474 (Apr. 1853) ("*Brachycome*"); Benth., Fl. Austral. 3: 512 (1867) ("*Brachycome*"); J.M.Black, Fl. S. Austral. 1st ed. 583, fig. 245C (1929) ("*Brachycome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 203, Fig. 72, 79, pl vi., map 23 (1948) ("*Brachycome*"), p.p. (excl. *B. nodosa* & *B. gracilis*); E.L.Robertson, J.M.Black's Fl. S. Austral., 852, Fig. 1152 C (1965, rev. edn) ("*Brachycome*"); J.H.Willis, Handb. Pl. Victoria 2: 672 (1973) ("*Brachycome*"), p.p. (excluding specimens of *B. gracilis* from Warby Range); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1452, Fig. 655F (1986) ("*Brachycome*"), p.p. (excluding ref. to distribution; E.Salkin et al., Austral. Brachyscomes 120 (1995); P.S. Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 847, Fig. 171d (1999). — **Type citation:** "Ante fodinas Burra Burra. Murray." **Lectotype:** Burra Mines, near creeks and on the swampy meadows, Oct. 1852, *F. Mueller* (MEL 692796) (Davis 1948, p. 203, Fig. 72). **Remaining syntypes:** Ad. fl. Murray, *Anon.* (MEL 692650 p.p., see note below).

Annual herb, major axes procumbent to erect, 1–9 cm long, with stalked, septate, glandular hairs. *Leaves* basal and cauline, mainly obovate to narrowly obovate or spatulate, 4.5–30 mm long, 0.5–4.5 mm wide, entire or more commonly lobed, with 3–8 broad lobes in the upper part, basally dilated, with stalked, septate, glandular hairs. *Peduncles* about half to several times the length of the uppermost leaves, with stalked, septate, glandular hairs. *Involucre* 3–7 mm diam. *Bracts* 7–15, in about 2 overlapping rows, elliptic, ovate or obovate, 2.3–3.7 mm long, 0.9–2.5 mm wide, thin, mainly herbaceous but with scarious, minutely denticulate often purplish margins, glabrous or with scattered, stalked glandular hairs. *Receptacle* subconical, areolate, glabrous. *Ray florets* 5–13, inconspicuous, corolla 1.7–2.7 mm long, 0.6–1.1 mm wide, 2-lobed, with 2 or 3 veins, white. *Disc florets* 9–33; corolla 0.95–1.5 mm long, 0.4–0.6 mm diam., (3) 4 (5)-lobed, yellow. *Stamens* (3) 4 (5); anthers 0.46–0.64 mm long, microsporangia 0.29–0.43 mm long, apical appendages 0.14–0.29 mm long. *Style* arms 0.39–0.6 mm long, the sterile appendage triangular and slightly shorter or longer than the stigmatic portion. *Cypselas* obdeltoid (ab/adaxial view), straight to distinctly curved in lateral view, 1.5–2 mm long, 0.9–1.2 mm wide, lateral surfaces each with two longitudinal, tuberculate ridges, the abaxial and adaxial surfaces smooth or the adaxial surface slightly tuberculate, the entire fruit dark brown to black, with glandular hairs and eglandular, biseriate, curved hairs; pericarp with

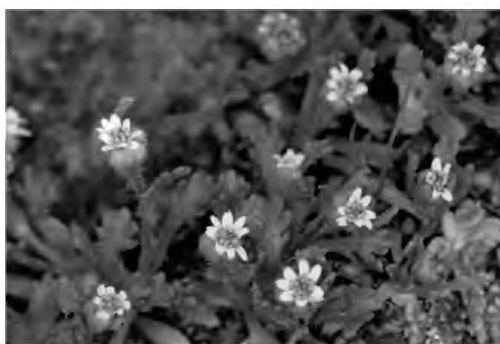


Fig. 17. *Brachyscome gonicarpa*, Mt Arapiles, Vic. — P.S. Short 3775.

an outer layer of large-celled parenchyma and an inner, continual layer of sclerenchyma; testa of thin-walled cells (P.S. Short 3322); carpopodium absent. Pappus asymmetrically placed, stellate, of 10–15 bristles, 0.3–0.7 mm long, white. Chromosome number:  $n = 4$ . Fig. 1H, 17.

**Distribution.** Southern, temperate, mainland Australia (W.A., S.A., Vic.) below 30°S.

**Habitat.** Commonly found in sand or sandy loams in mallee *Eucalyptus* associations and in taller woodland, e.g. in *Eucalyptus fasciculosa* woodland in south-eastern South Australia.

**Phenology and reproductive biology.** Undoubtedly an autogamous species, *B. gonicarpa* has inconspicuous ray florets and usually 4-lobed disc florets. Watanabe et al. (1991) reported pollen:ovule ratios ranging from 160 to 256 for 15 individuals from a collection (P.S. Short 3743) gathered near Lock, Eyre Peninsula, S.A.; five additional estimations of pollen ovule ratios, ranging from 111 to 162, have since been determined from P.S. Short 3775 (Fig. 17), a collection from Mt Arapiles, Vic.

Salkin et al. (1995) indicated that seed germinated poorly after ten days to six months, suggesting that inhibitors were present.

**Cytology.** Chromosome number of  $n = 4$  and  $2n = 8$  have been recorded for this species from Elliston (Eyre Peninsula, S.A.; C.R. Carter unpubl., reported in Watanabe et al. (1991), Lock (Eyre Peninsula; Watanabe & Short 1992) and Mt Arapiles (Vic.; Watanabe & Short 1992, Fig. 1A). Idiograms of somatic metaphase chromosomes were published in Watanabe et al. (1991, Fig. 12 & 15; 1999, Fig. 68).

**Typification.** The sheet MEL 692650 contains a single, mounted plant accompanied by two labels. One label indicates that the specimen was gathered by Mueller in 1850 from the vicinity of Enfield, the other that it was gathered by Mueller in 1851 from the Mt Lofty Ranges. Although collected prior to the publication of the name,

neither can be regarded as syntypes as the labels do not agree with the protologue. However, on the same sheet there is an envelope which contains fragmentary material, including mature fruit, of the species. The envelope is merely labelled “Ad. fl. Murray” and is also initialled with the letter “B”, indicating that it was seen by Bentham. There can be little doubt that this material is a syntype specimen of the name *B. gonicarpa*.

#### *Selected specimens examined.*

WESTERN AUSTRALIA: S of Peak Charles, 26 Sept. 1984, M.A. Burgman 3674 (PERTH); Cowallup Rocks, 26 Aug. 1973, K. Newbey 3724 (PERTH); c. 100 km E of Esperance, 1 Oct. 1970, P.G. Wilson 10019 (PERTH).

SOUTH AUSTRALIA: 10 km W of Black Hill, 28 Sept. 1986, A.G. Spooner 10314 (AD, CBG); Hundred of Blessing, 5 Oct. 1967, J.R. Wheeler 599 (AD); Narrung Peninsula, 11 Sept. 1974, L.D. Williams 5747 (AD).

VICTORIA: Dattuck Track, Wyperfeld N.P., 2 Oct. 1968, A.C. Beauglehole 28844 (AD, MEL); 1 km ENE of Spectacle Lake, 9 Oct. 1986, D.C. Cheal (MEL 685202); 15 miles N of Serviceton, 17 Sept. 1948, J.H. Willis (MEL 692641).

#### 12. *Brachyscome gracilis* G.L.R.Davis

Proc. Linn. Soc. New South Wales 79: 206, Fig. 9–13 (1955) (“*Brachycome*”); J.H. Willis, Handb. Pl. Victoria 2: 674 (1973) (“*Brachycome*”); J. Everett in G.J. Harden, Fl. New South Wales 3: 162 (1992) (“*Brachycome*”); E. Salkin et al., Austral. Brachyscomes 122 (1995); P.S. Short, in N.G. Walsh & Entwisle, Fl. Victoria 4: 846, Fig. 171b (1999). — **Type citation:** “Holotype: Mt. Major, Dacite outcrop near Dookie, Victoria, 28.10.1953, A. Tylee (MEL). Paratypes: Five. Loc. cit.; in sandy loam at Mt. Major, 6.11. 1949, A.S. Forgas (MEL).” **Holotype:** MEL 724556 p.p. **Isotypes:** MEL 724556 p.p., MEL 724557, MEL 594985, K 000882311, NSW 224131.

[*Brachyscome gonicarpa* auct. non Sond. & F. Muell. ex Sond.: G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 203 (1948) (“*Brachycome*”), p.p. (as to most specimens from N.S.W. and some Victorian specimens); J.H. Willis, Handb. Pl. Victoria 2: 672 (1973) (“*Brachycome*”), p.p. (as to specimens from Barnawartha and Warby Range).]

Annual herb, branches ascending to erect, 6–35 cm long, weakly striated, with an indumentum of scattered, eglandular septate hairs c. 1–1.5 mm long, and scattered to moderately dense, shortly stalked glandular hairs less than c. 0.1 mm long. Leaves basal and cauline, 0.4–9 cm long, 0.05–1.8 cm wide, one or two uppermost leaves small and entire but the remainder variously lobed, commonly 1-pinnatisect but sometimes these lobes also divided, all leaves usually conspicuously dilated towards the base, glabrous or with some scattered eglandular and glandular hairs as found on the major axes, the uppermost leaf usually with a scarious apex. Peduncles longer than the uppermost cauline leaves, glabrous or shortly stalked glandular hairs present. Involucre c. 5–9 mm diam. Bracts 8–14 in 1 or c. 2 rows, of about equal length, elliptic to somewhat narrowly elliptic, ovate, or obovate to oblanceolate, 1.6–4.1 mm long, 0.8–1.7 mm wide, mainly green but with scarious, minutely denticulate often purplish margins, the outer surface

glabrous or with scattered, shortly stalked glandular hairs. *Receptacle* somewhat conical, areolate, glabrous. *Ray florets* female, 6–17; corolla c. 4–5 mm long, 1.1–1.5 mm wide, white. *Disc florets* bisexual, 12–c. 40, yellow. *Stamens* 5; anthers c. 0.75–1.0 mm long, microsporangia c. 0.53–0.72 mm long, apical appendages c. 0.22–0.3 mm long, filament collar more or less straight in outline and basally not thicker than the filament. *Style* 1.7–2.1 mm long, branches 0.6–0.64 mm long, sterile appendages more or less triangular, slightly longer than the stigmatic portion. *Cypselas* more or less obovoid (ab/adaxial view), distinctly curved (lateral view), 1.1–2.2 mm long, somewhat heteromorphic with those of the ray florets with more or less one lateral, somewhat tuberculate ridge but those of the disc florets usually with 2 somewhat distinct, equally developed longitudinal ridges and with tubercles between the ridges, the ridges usually broadening in the upper part to form shoulders, all fruit red-brown or black, and each tubercle terminating in a curled eglandular hair, glandular hairs absent; pericarp with 2 vascular bundles; testa of thin-walled cells (*N.H. Scarlett* 83/324); carpodium lacking, the fruit with a peg-like base. *Pappus* bristles c. 25–30, erect, 0.2–0.4 mm long, white or yellowish white. *Chromosome numbers*:  $n = 4$ ,  $2n = 24$ . **Fig. 11.**

*Distribution.* An eastern Australian species extending from north-western and central Victoria to northern New South Wales.

*Habitat.* See under subspecies.

*Reproductive biology.* Both subspecies have reasonably conspicuous ray florets and disc florets with five stamens, which suggests reasonably high levels of cross-pollination, as is also suggested by the pollen:ovule ratios recorded for subsp. *gracilis*.

Salkin et al. (1995) indicated that seed germinates in 10–80 days and noted that the rate of germination varied depending on the provenance and age of seed.

*Cytology.* See under subspecies.

*Typification.* This species was first recognised following the collection of two plants by A.S. Forgas in 1949. Subsequently, a larger gathering was obtained by A. Tylee in October 1953 and Davis nominated a single plant from this gathering as the holotype specimen of the name *B. gracilis*. Remaining plants from this gathering were called paratypes. She also considered the Forgas collection to be part of the “type series”, referring to the constituent plants as paratypes. However, those gathered by Forgas have no type status, while the remaining individuals gathered by Tylee are isotypes. Subsequent to Davis’s revision isotypes were sent to both K and NSW.

*Note.* Cunningham et al. (1981) recorded this species as occurring at Lake Cargellio but I have not seen any specimen which substantiates this record.

### Key to subspecies of *B. gracilis*

1. Largest basal leaves to c. 33 mm long, with 3–17 lobes; mature cypselas red-brown ..... **12a. subsp. *gracilis***
- 1: Largest basal leaves usually more than 35 mm long, with 3–12 lobes; mature cypselas red-brown or black ..... **12b. subsp. *robusta***

### 12a. *Brachyscome gracilis* subsp. *gracilis*

[*Brachyscome goniocarpa* auct. non Sond. & F.Muell. ex Sond.: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 203 (1948) (“*Brachycome*”), p.p.; J.H.Willis, Handb. Pl. Victoria 2: 672 (1973) (“*Brachycome*”), p.p.]

[*Brachyscome diversifolia* var. *dissecta* auct. non G.L.R. Davis: Smith-White et al., Austral. J. Bot. 18: 104, Fig. 55 & 65 (1970) (“*Brachycome*”).]

Basal leaves 1–3.3 cm long, 0.2–0.7 (1.2) cm wide, with 3–12 (17) lobes. *Cypselas* 1.1–1.9 mm long, red-brown when mature.

*Distribution.* Extending from central Victoria to northern New South Wales. A plot of the distribution of populations as compiled from herbarium specimens indicates a disjunction between populations from northern New South Wales and those from Victoria and southern New South Wales.

*Habitat.* Usually grows in sandy to clay loam in open *Eucalyptus* woodland and forest but collections from northern New South Wales have been gathered from *Callitris* woodland.

*Reproductive biology.* Pollen:ovule ratios ranging from 990 to 2,164 were calculated from five capitula of *P.S. Short* 3364.

*Cytology.* Chromosome number of  $n = 4$  and  $2n = 8$  have been determined for this subspecies in north-eastern Victoria (Killawarra State Forest) and in several locations in New South Wales (Ashford, Bendemeer and Uralla) (Smith-White et al. 1970, Fig. 55 & 65, as *Brachyscome diversifolia* var. *dissecta*; Watanabe & Short 1992, Fig. 1B and Watanabe et al. 1996b as *Brachyscome gracilis*). Note that in Table I in Watanabe et al. (1996b) the diploid number is erroneously reported as  $2n = 18$  but correctly reported as  $2n = 8$  in Table II.

An idiogram of somatic metaphase chromosomes was published in Watanabe et al. (1999, Fig. 67, as *Brachyscome gracilis*).

### Selected specimens examined.

NEW SOUTH WALES: Bendemeer, 2 Nov. 1955, G.L. Davis (AD 95809028); Wagga, J.J. Fletcher (NSW 15446); Ryan, near Henty, 13 Oct. 1950, E.J. McBarron 5081bis (NSW); 7.5 km towards Ashford from Bonshaw–Glen Innes road, 29 Jan. 1993, P.S. Short 3962 (AD, CANB, MEL, NSW, TI); 21 miles S of Uralla, 8 Jan 1969, S. Smith-White 3299 (SYD).

VICTORIA: Timber reserve, Dookie Agricultural College, 3 Nov. 1983, N.H. Scarlett 83–315 (MEL); 9 km ENE of Thoona, 4 Nov. 1983, N.H. Scarlett 83–317 (MEL); Beechworth, rock faces NE of the miner’s cottage at the Powder Magazine, 5 Nov. 1983, N.H. Scarlett 83–328 (MEL); 8.4 km S of Tatong, 5 Nov. 1983, N.H. Scarlett 83–336 (MEL); Killawarra State Forest, 15 Nov. 1988, P.S. Short 3361 (MEL).

**12b. *Brachyscome gracilis* subsp. *robusta* P.S.Short, subsp. nov.**

**Type:** Victoria, Kings Billabong State Game Reserve, East side of Kings Billabong near opposite bank to Old Billabong Pump House, about 10 kms due south-east of Mildura Post Office. On slight rises in *Eucalyptus largiflorens* floodplain, 19 Oct. 1987, *J.H. Browne* 397 (**holotype:** MEL 1555593; **isotypes:** AD 98836149, CBG *n.v.*, E *n.v.*).

*Brachyscome* aff. *gracilis*: Salkin et al., Austral. Brachyscomes 122 (1995).

Basal leaves (1.2) 3–6 (9) cm long, (0.25) 0.5–1.2 (1.8) cm wide, with 3–8 (12) lobes. *Cypselas* 1.3–2.2 mm long, red-brown or black when mature.

**Distribution.** The subsp. *robusta* is only known from Kings Billabong, near Red Cliffs, in north-western Victoria.

**Habitat.** Grows in clay soils in a floodplain dominated by *Eucalyptus largiflorens*.

**Cytology.** This taxon has  $2n = 24$  (Watanabe & Short 1992, as *Brachyscome* aff. *gracilis*) and is presumably a hexaploid based on  $x = 4$ .

**Notes.** The subsp. *robusta* is difficult to recognise on morphological grounds and it is this impracticality that prevented me recognising it as a species. Both the ploidy level and the floodplain habitat of this taxon support its formal recognition. Because of the disjunct distribution the subspecies category has been chosen.

A *t*-test performed to examine differences in fruit length showed a statistically significant difference ( $P < 0.001$ ) between fruit of *B. gracilis* subsp. *gracilis* (Scarlett 83-315;  $n = 100$ , range 1.1–1.9, mean = 1.41 mm, s.d. = 0.139) and subsp. *robusta* (Browne 397;  $n = 100$ , range 1.3–2.2, mean = 1.65 mm, s.d. = 0.174).

**Selected specimens examined.**

VICTORIA: Kings Billabong, 23 Aug. 1980, *J.H. Browne* (MEL 1536538, MEL 1536537); Kings Billabong, 6 Sept. 1980, *J.H. Browne* (MEL 595989); Kings Billabong, 15 Sept. 1986, *J.H. Browne* 402 (CBG, MEL).

**13. *Brachyscome nodosa* P.S.Short & K.Watan.**

Austral. Syst. Bot. 6: 335, Fig. 2 & 3 (1993); E.Salkin et al., Austral. Brachyscomes 162 (1995). — **Type citation:** “*Holotypus*: Queensland, 28 km from Inglewood along road to Stanthorpe, at Bracket Creek crossing, 28°32'S, 151°21'E. On roadside, mixed with *Cotula australis*, 29 Sept. 1992, *K. Watanabe* 19, *M. Ito*, *K. Kosuge* & *C.R. Carter* (MEL 2014415). *Isotypi*: BRI, NSW, TI.”

*Brachyscome* sp. aff. *goniocarpa*, K.Watan. & P.S.Short, Muelleria 7: 460, 469 (1992).

*Brachyscome* sp. A, J.Everett in G.J.Harden, Fl. New South Wales 3: 156, 162 (1992) (“*Brachycome*”).

[*Brachyscome gonocarpa* auct. non. Sond. & F.Muell. ex Sond.; G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 203 (1948) (“*Brachycome*”), p.p.; Smith-White et al., Austral. J. Bot. 18: 104, 116, Fig. 56, 66 (1970) (“*Brachycome*”); Stanley in Stanley & E.M.Ross, Fl. SE Queensl. 2: 511, Fig. 711 (1986).]

Annual herb. Major axes procumbent to erect, to c. 20 cm long, with long, septate hairs and some short, glandular hairs, green. *Leaves* basal and cauline, usually 1- or sometimes 2-pinnatisect or deeply lobed but the uppermost leaves often entire and linear, up to c. 4 cm long, all leaves somewhat dilated and sheathing at the base, with long, septate hairs and often with scattered, shortly stalked glandular hairs. *Peduncles* extending well above the leaves, green, glabrous or with scattered septate, eglandular hairs. *Involute* c. 4–8 mm diam. *Bracts* 9–20, overlapping, mainly obovate or elliptic, sometimes ovate, 2.2–4.2 mm long, 1.1–2 mm wide, mainly herbaceous but with scarious, minutely denticulate apices and margins, glabrous or with scattered, shortly stalked glandular hairs. *Receptacle* subconical, pitted, glabrous. *Ray florets* female, 10–19; corolla 4.1–10.8 mm long, 1.3–2.5 mm wide, with 4 (5) veins, white or mauve. *Disc florets* bisexual, 31–114; corolla 1.4–2.6 mm long, c. 0.5 mm diam., yellow. *Stamens* 5; anthers 0.97–1.3 mm long, microsporangia 0.68–0.93 mm long, apical appendages 0.23–0.45 mm long, base obtuse, endothelial tissue radial, filament collar more or less straight in outline and basally not thicker than the filament. *Style* 1.45–2.2 mm long, branches 0.5–0.9 mm long. *Cypselas* somewhat heteromorphic, 1.3–2.2 mm long, 0.6–1.7 mm wide; outermost fruit, particularly those of the ray florets, usually with a prominent crest, all fruit with large tubercles on the lateral faces and sometimes on the adaxial and abaxial surfaces, dark brown or black, glabrous or with some inrolled hairs; pericarp with 2 vascular bundles; testa of thin-walled cells (*A. Salkin*, MEL 2028633); carpodium lacking. *Pappus* stellate, of more than 20 smooth bristles up to c. 0.5 mm long, obliquely placed, white. *Chromosome number*:  $n = 3$ .

**Distribution.** Southern Queensland and northern New South Wales between latitudes c. 27° and 31°S and between longitudes c. 144° and 151°E. A collection by Boorman (NSW 15465) gathered from “Gilmore near Tumut” represents a major disjunction. It seems likely that the label is erroneous.

**Habitat.** Collector’s notes on the habitat of *B. nodosa* suggest that it commonly grows in disturbed sites, often along roadside margins, and in a variety of soil types, including sand, loam and clayey soils.

**Reproductive biology.** Pollen:ovule ratios ranging from 1,331 to 3,738 were reported by Short & Watanabe (1993).

Salkin et al. (1995) recorded poor seed germination after 5–40 days.

**Cytology.** In Queensland determinations of  $n = 3$  have been obtained from Charleville, Cunnamulla, Milmerran and the Inglewood region, including the type locality (Smith-White et al. 1970, as *B. gonocarpa*; Watanabe & Short 1992, as *B. sp. aff. gonocarpa*; Watanabe et al. 1996b). The same haploid number has been obtained in

New South Wales, i.e. from Bourke and the Narrabri-Coonabarabran region (Smith-White et al. 1970, as *B. goniocarpa*; Watanabe et al. 1996b).

Watanabe et al. (1999, Fig. 74, specimens from Bracket Ck, Qld, Watanabe 19) have published an idiogram of somatic metaphase chromosomes of this species.

**Notes.** The prominent tubercles on the lateral faces of the cypselas and the horn-like apices of the outer cypselas in a capitulum occur late in the development of fruit; large but immature, greenish cypselas may have almost smooth faces and occasionally the horn-like apex is even poorly developed in mature fruit.

*Brachyscome nodosa* was included by Davis (1948) under *B. goniocarpa*. As well as the horn-like apex of the fruit it differs from that species in many other ways. For example, in *B. goniocarpa* the corolla of the ray florets is shorter (2.1–2.7 cf. 4.1–10.8 mm long), the anthers are smaller (0.49–0.64 cf. 0.97–1.3 mm long), and fewer pollen grains are produced per floret (232–368 cf. 1528–4522).

#### *Selected specimens examined.*

QUEENSLAND: Between Bollon and Cunnamulla, 21 km west of Nebine Creek, along the Balonne Highway, 30 Aug. 1983, H.I. Aston 2435 (BRI, MEL); Watson St, Cunnamulla, 11 Aug. 1989, E. Salkin (MEL); Mosquito Creek Road turn-off 15.5 km E of Inglewood along Cunningham Hwy, 29 Sept. 1992, K. Watanabe 20 et al. (BRI, MEL, TI); 14.5 km N of intersection of Millmerran-Inglewood road with Cunningham Hwy, along road to Millmerran, 29 Sept. 1992, K. Watanabe 24 et al. (BRI, MEL, TI); Bybera, 20 Sept. 1944, C.T. White 12619 (BRI, NSW).

NEW SOUTH WALES: 61.7 km NE of the Billabong bridge over the Barwon River, Brewarrina on the Narran Lake road, 7 Sept. 1986, J.M. Dalby 86/45 & Coveny (BRI, NSW n.v., PRC n.v.); 'Lisgar', about 15 km S of Yetman, 22 Sept. 1988, C.W.E. Moore 8697 (CANB); 26 miles N of Bourke, 10 Sept. 1968, S. Smith-White 68/2490-2493 (SYD); Pilliga Forest, Sept. 1913, E.H.F. Swain 7039/13 (NSW); 69–100 km N of Coonabarabran on Newell Hwy, 25 Sept. 1992, K. Watanabe 8 et al. (MEL, NSW, TI).

#### 14. *Brachyscome readeri* G.L.R.Davis

Proc. Linn. Soc. New South Wales 73: 204, Fig. 73, 80, pl. vi, map 24 (1948) ("*Brachycome*"); J.H. Willis, Handb. Pl. Victoria 2: 672 (1973) ("*Brachycome*"); G.M. Cunningham et al., Pl. W. New South Wales 651, Fig. 64q (1981) ("*Brachycome*"); D.A. Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1456, Fig. 657B (1986) ("*Brachycome*"); J. Everett in G.J. Harden, Fl. New South Wales 3: 160 (1992) ("*Brachycome*"); E. Salkin et al., Austral. Brachycomes 198 (1995); P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 847, Fig. 171c (1999). — **Type citation:** "*Holotype:* Wannon Valley, 10.11.1902, H.B. Williamson (MEL). *Paratypes:* Four, l.c. (MEL)."  
**Holotype:** MEL 220376 p.p. **Isotypes:** MEL 220376 p.p.

*Brachyscome goniocarpa* var. *longiscapa* F.M. Reader, Victorian Naturalist 23: 25 (1906) ("*Brachycome*"), nom. nud.

Annual herb, branches erect, 3–22 cm long, with scattered septate eglandular hairs. Leaves basal and

cauline, mainly linear or narrowly obovate, 0.5–8 cm long, 0.05–1.2 cm wide, entire or c. the upper half 1- or 2-pinnatisect, basally dilated, very slightly succulent. Involucre c. 2–6 mm diam. Bracts 5–15, in c. 1 row and of similar length, elliptic to narrowly elliptic or ovate, 2–4.5 mm long, 0.8–2 mm wide, thin, mainly herbaceous but with scarious, sometimes purplish margins, glabrous. Receptacle conical, areolate, glabrous. Ray florets 5–13. Ray corolla 3.8–5.7 mm long, 1.4–2 mm wide, white or mauve, 4- or 5-veined, apically slightly pointed or minutely 2-lobed. Disc florets 6–19; corolla yellow, tube 1.4–2 mm long, 5-lobed. Stamens 5; anthers 0.89–1.08 mm long; microsporangium 0.62–0.86 mm long; apical appendage 0.22–0.32 mm long. Style 1.3–1.67 mm long; style arms 0.56–0.74 mm long, appendages somewhat triangular, 0.36–0.52 mm long and exceeding the stigmatic part; stigmatic part 0.16–0.26 mm long. Cypselas in ab/adaxial view broadly obdeltooid or obdeltooid, in lateral view straight, 1–1.8 mm long, 0.9–1.3 mm wide; lateral surfaces each with two longitudinal, smooth to tuberculate ridges; ab/adaxial ribs smooth or almost so; the entire cypselas greenish or dark purplish brown, glandular hairs may be present but eglandular hairs absent; pericarp with 2 vascular bundles; testa of thin-walled cells (*A.C. Beauglehole 8711*); carpodium absent. Pappus of 20–25 spreading, non-erect bristles 0.2–0.6 mm long, white or brownish-white. Chromosome number:  $n = 5$ .

**Distribution.** South-eastern South Australia, Victoria and south-eastern New South Wales (north to about Forbes). Specimen data indicate a major disjunction between those populations from South Australia and adjoining areas of south-western Victoria and those from north-eastern Victoria and southern New South Wales. Those from the Lachlan River floodplain south of Forbes are also disjunct from those associated with the Murray River catchment.

**Habitat.** Often grows in areas subject to inundation, e.g. in south-western Victoria it has been recorded on black clay in *Casuarina luehmannii* woodland and throughout much of its range it is found in red gum (*Eucalyptus camaldulensis*) communities. In N.S.W. it is common in open black box (*E. largiflorens*) communities.

**Phenology and reproductive biology.** Flowering is recorded from September to November.

Plants may flower when very small. One plant just three cm tall produced a capitulum with an involucre of five bracts and containing just 5 ray and 7 disc florets, suggesting that even in seasons of poor rainfall plants will successfully reproduce.

Pollen:ovule ratios ranging from 1,274 to 2,145 were determined for five capitula of *P.S. Short 3917*.

Salkin et al. (1995) recorded moderately good germination of seed in 15–50 days.

**Cytology.** A haploid chromosome number of  $n = 5$  has been recorded for two populations, both from north-

eastern Victoria, i.e. from Tallagiera Forest and Ulupna Island (Watanabe & Short 1992; Watanabe et al. 1996b, Fig. 1 B). Watanabe et al. (1999, Fig. 59) published an idiogram of somatic metaphase chromosomes.

*Notes.* *Brachyscome readeri* is a somewhat variable species in respect to leaf morphology, with specimens from south-eastern South Australia and south-western Victoria tending to have undivided or rarely more than 3-lobed leaves and those from northern regions commonly having many-lobed leaves. There is also variation in cypsela morphology, with, for example, differences in colour of mature fruit (dark green or dark purplish brown) and the extent to which tubercles develop on the lateral surfaces. However, the variation is such that recognition of infraspecific taxa seems untenable, as evident for example from the variable leaf morphologies exhibited by plants from *K. Alcock 66* and *A.C. Beaughlehole 81217*.

The species is most likely to be confused with *B. gracilis* which is vegetatively similar to, particularly, the northern populations of *B. readeri*. However, the leaves and branches of *B. readeri* lack the scattered but generally large numbers of short, glandular hairs found in *B. gracilis* and that species has curved, often reddish cypselas.

Although tending to be held erect in immature florets the short pappus bristles are horizontal or even downward-sloping in mature fruit. This character is seemingly unique to *B. readeri*; although the bristles in both *B. goniocarpa* and *B. nodosa* tend to be spreading and only semi-erect.

#### *Selected specimens examined.*

SOUTH AUSTRALIA: The Gap & Frances road, 29 Sept. 1983, *K.M. Alcock 66* (AD); c. 3 km W of Joanna, *D.N. Kraehenbuehl 1026* (AD).

VICTORIA: Tocumwal Regional Park, 27 Sept. 1985, *A.C. Beaughlehole 81217* (MEL); Wannon River, Nov. 1903, *F.M. Reader* (MEL 1590953); Tallagiera Forest, 2 Nov. 1990, *P.S. Short 3917* (MEL).

NEW SOUTH WALES: 20 km W of Urana along Jerilderie road, 13 Oct. 1993, *D. Mallinson 307* (CBG); Wirrinya, 24 Aug. 1955, *C.K. Ingram* (NSW 230265); Marsden, 19 Sept. 1955, *C.K. Ingram 476.124b* (NSW).

#### 15. *Brachyscome segmentosa* C.Moore & F.Muell.

in F.Muell., *Fragm.* 8: 144 (1874) ("*Brachycome*"); G.L.R. Davis, *Proc. Linn. Soc. New South Wales* 73: 202, Fig. 71, 78 (1948) ("*Brachycome*"); P.S.Green, *Fl. Australia* 49: 384 (1994); E.Salkin et al., *Austral. Brachyscomes* 208 (1995). — **Type citation:** "In montibus et praesertim eorumdem cacuminibus insulae Howei; Fullagar et Lind; C. Moore." **Lectotype:** Lord Howe Island, summit of Mt Gower, *Fullagar & Lind 89* (MEL 220418). (Davis 1948, p. 202, Fig. 71). **Isolectotype:** MEL 220421. **Remaining or possible remaining syntypes:** Mt Lidgbird, *Fullagar 89* (MEL 220419); Lord Howes Island, *C. Moore 32* (MEL 220420); Lord Howe's Island, *Anon.* (NSW 4793, ? p.p.); Mt Lidgbird, *C. Moore 33* (MEL 220417); Howe's Isl., *Anon.* (MEL 220422, ? ex herb. Sonder).

Perennial herb, branching at the base and upper nodes, at least the flowering stems held erect but large plants scrambling and at least in cultivation the branches spreading to at least 1 m, glabrous or with a few long, septate eglandular hairs mainly near the base of the leaves. *Leaves* basal and cauline, the largest spatulate or narrowly obovate in outline, 23–77 mm long, 8–25 mm wide, 1-pinnatisect and with the resulting lobes 7–16 mm long, 1.5–6.5 mm wide and each of these usually with 3 (–5) apical teeth or very short lobes, only occasionally untoothed or with a tooth or lobe below the apex, one or several leaves on the flowering stems entire and linear, all leaves only slightly dilated at the base. *Involute* c. 8–10 mm diam. *Bracts* c. 20 in 1 or 2 rows of similar length, elliptic to barely narrowly elliptic or obovate, 4.5–7 mm long, 1.6–2.6 mm wide, thin, mainly herbaceous but with hyaline margins and apices, upper margins with shortly stalked glandular hairs. *Receptacle* subconical. *Ray florets* c. 30 or more, corollas 8–15 mm long, with 4 or 5 veins, white or white above and pale mauve below or entirely mauve. *Disc floret* number not determined; corolla tube 1.7–2.5 mm long, 5-lobed, yellow, venation prominent at least in dried specimens. *Stamens* 5; anthers c. 1.25–1.35 mm long; microsporangium c. 0.9–1 mm long; apical appendages triangular, c. 0.35 mm long; filament collar more or less straight in outline and basally not thicker than the filament. *Style* 3.1–3.7 mm long; style arms c. 0.8 mm long, appendages somewhat triangular but apically rounded and slightly exceeding the stigmatic part. *Cypselas* pale brown, in lateral view straight or very slightly curved and 2.4–2.6 mm long, c. 1 mm wide; lateral surfaces each with two, distinct, longitudinal ridges which become more prominent at the apex of the fruit, the lateral surfaces with a few scattered tubercles between the ridges and the tubercles ending in short, somewhat straight, non-bifid eglandular hairs; ab/adaxial ribs smooth or almost so; carpodium absent, the base peg-like. *Pappus* of numerous erect bristles 0.4–0.8 mm long, white or very pale yellowish. *Chromosome number:* unknown.

*Distribution.* Confined to Lord Howe Island, and mostly (if not only) found on the slopes of Mts Gower and Lidgbird.

*Habitat.* The species is most commonly found on rocky ledges at higher elevations, with Pickard (1983) recording it as a common herb in closed evergreen scrub dominated by *Dracophyllum fitzgeraldii* and *Metrosideros nervulosa* at an altitude of 380–530 m and its occurrence at these altitudes on basal slopes of both Mts Lidgbird and Gower is generally confirmed by notes accompanying herbarium specimens. On one specimen, *Rodd 1767*, it is also noted that plants were scrambling over rocks with "much *Carex* about".

Green (1994) recorded that the species is occasionally found in coastal situations, citing *McComish 124* as having been gathered from "edge of beach, S end of



lagoon". This information must be from the K specimen (not checked by me) and may be erroneous as notes on the duplicate collection in NSW merely record it as coming from Lord Howe Island and having the local name of Mountain Daisy.

*Phenology and reproductive biology.* Flowering and fruiting has been recorded from August to March.

A species with large, showy capitula which are indicative of cross-pollination. In cultivation it spreads by layering (Salkin et al. 1995) and presumably does so in the wild.

Salkin et al. (1995) recorded good germination in 7–20 days.

*Cytology.* No data available.

*Typification.* Of the remaining or possible remaining syntype specimens, the one attributed to Fullagar and stated to have been gathered from Mt Lidgbird (MEL 220419) has the number "89" lightly pencilled on the label, the rest of the label being in ink, suggesting that unless Fullagar used a species number and not a specimen number, that the number was added in error.

Two other specimens, one at K and the other MEL 220422, look similar, and have printed blue "Phytologic Museum of Victoria" labels with the handwritten information "Brachycome segmentosa FvM/ Howe's Isl.". The K specimen is further annotated as being received at Kew in August 1874. These facts leave little doubt that they are duplicates of the same collection and were seen by at least one of the names' authors, but it is not clear whether they were collected by Moore, who visited the island in 1869, or J.P. Fullagar, who visited in 1873 and 1874 (Green 1994). The MEL specimen is labelled as coming from the herbarium of O.W. Sonder, but if this is the case then Mueller was still sending plants to Sonder at the same time as he was attempting to purchase Sonder's private herbarium, a process he initiated in 1859 but wasn't finalised until 1883 (Short 1990); an unlikely scenario indicative of mislabelling.

Of the other possible remaining syntypes listed above I have attributed both MEL 220417 and MEL 220420 to Charles Moore on the basis that both are consecutively numbered ("32" and "33") and that someone has recorded on the sheet that Moore was the collector of specimen "33". The fact that Moore was based in Sydney suggests that the specimen NSW 4793 also contains syntype material, at least in part. The shape of the leaves on at least the upper two branchlets attached to the sheet seem to be of another species of *Brachyscome* s.lat. from eastern Australia.

*Notes.* This species is closely related to *B. diversifolia* but the scrambling habit exhibited by well-established wild plants generally distinguishes it from that species. It most closely resembles forms which have been previously attributed to *B. diversifolia* var. *maritima* but none have the exact leaf size and shape – in particular in having at least some leaves which prominently dilate

towards the base – and usually differ in having larger involucre bracts and, although they may be nearly glabrous, are commonly manifestly hairy.

#### *Selected specimens examined.*

NEW SOUTH WALES: Lord Howe Island. N slope of Mt Lidgbird, 22 Oct. 1978, M.D. Crisp 4519 (CBG); Mt Gower, north spur, 23 Oct. 1978, M.D. Crisp 4534 (CBG); Erskine Valley, not far below The Saddle, 25 Mar. 1971, A. Rodd 1767 (NSW).

### *Brachyscome ciliaris* group

*Steiroglossa* DC., *Prodr.* 6: 38 (1838). — **Lectotype** (designated above): *S. rigidula* DC.

*Silphiosperma* Steetz in Lehm., Pl. Preiss. 1: 433 (1845).

— *Brachyscome* sect. *Silphiosperma* (Steetz) Benth., Fl. Austral. 3: 510 (5 Jan. 1867) ("*Brachycome*"). — *Bellis* sect. *Silphiosperma* (Steetz) Kuntze in T. Post & Kuntze, Lex. Gen. Phan., Prosp. 164 (Dec. 1903).

— *Ctenosperma* F. Muell. ex Pfeiff., Nomencl. Bot. 1: 936 (1874), pro syn., nom. inval., later homonym of *Ctenosperma* Hook.f. — **Lectotype** (designated above): *S. glandulosum* Steetz.

*Brachyscome* Cass. subgenus *Metabrachyscome* G.L.R. Davis "superspecies *trachycarpa*" (Davis, 1948, pp. 151–152, 218–226, 238) ("*Brachycome*").

*Brachyscome* Cass. subgenus *Metabrachyscome* G.L.R. Davis "superspecies *tesquorum*" (Davis 1948, pp. 148, 151, 206–208) ("*Brachycome*").

*Brachyscome ciliaris* group: P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 842 (1999).

*Brachyscome parvula* group: P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 853 (1999).

*Brachyscome perpusilla* group: P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 854 (1999).

*Brachyscome rigidula* group: P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 855 (1999).

*Brachyscome trachycarpa* group: P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 858 (1999).

Annual or non-rhizomatous perennial herb or subshrub, often apomictic; base of branches of subshrubs may have corky bases. *Leaves* basal and cauline, entire or 1 or 2-pinnatisect or pinnatilobed. *Rays* white or shades of mauve or purple, in some taxa the corolla highly reduced. *Disc corolla* usually 5-lobed but sometimes 4-lobed in *B. perpusilla*. *Style appendages* triangular to narrowly triangular. *Anthems* with terminal appendages commonly absent or barely developed but present in *B. blackii*, *B. tesquorum* and *B. xanthocarpa*; pollen absent or present. *Cypselas* dimorphic, with ray *cypselas* with broad ab/adaxial margins and *disc cypselas* thin, with ab/adaxial wing-like extensions or *cypselas* monomorphic and either with broad ab/adaxial ridges as in ray *cypselas* of taxa with dimorphic fruit or thin and with ab/adaxial wing-like extensions as in the *disc cypselas* of taxa with dimorphic fruit; all *cypselas* somewhat uniformly coloured or discoloured and the fruit body usually darker than the ab/adaxial margins and wings; all *cypselas* usually lacking longitudinal ridges (present in *B. tesquorum*); carpodium present; biseriate eglandular hairs usually apically inrolled, sometimes only curving along their length as in *B.*



*rigidula*; pericarp with 2 vascular bundles, secretory canals absent; testa cells usually with u-shaped thickening but sometimes evenly-thickened or thin (*B. parvula*). *Pappus* absent or present. *Chromosome number*:  $x = 9$ .

**Notes.** The majority of members of this group have been referred to as the *B. ciliaris* complex (e.g. Watanabe & Short 1992) or *B. ciliaris* group (Short 1999). As defined here it also includes members of the *B. rigidula* complex and the *B. trachycarpa* complex, the possible relationship of both groups having been noted by Davis (1948), who referred all of the aforementioned species to “superspecies *trachycarpa*”. I have also included *Silphiosperma* (Davis’s “superspecies *silphiosperma*”), the winged fruit suggesting to me a close relationship with forms of the *B. ciliaris* complex, and three members of Davis’s “superspecies *iberidifolia*”, *B. billardiarei* (= *B. ciliaris* s.lat.), *B. pusilla* and *B. tatei*, all of which have flat, discolorous cypselas as in most of the other aforementioned species. Furthermore, I have included *B. blackii* and *B. tesquorum*, the only members of Davis’s “superspecies *tesquorum*”. Despite their having terminal anther appendages, and the cypselas of *B. tesquorum* having longitudinal ridges on their lateral surfaces, aspects of habit, leaf and hair morphology and a chromosome base number of  $x = 9$  suggest strong affinities with some other entities here included in the *B. ciliaris* group.

One of the more intriguing aspects of this group of species is the presence of monomorphic fruit (unwinged or winged) in some taxa, and dimorphic (unwinged and winged) fruit in a capitulum in other taxa. In species with dimorphic fruit there is usually a distinct switch from unwinged fruit in the outer ray florets to winged in the disc florets; only very occasionally, as in *B. ciliaris* var. *brachyglossa*, is there some gradation between the two types, with some disc cypselas not or only partly developing a wing on one margin.

Previous workers have commented on the taxonomic difficulty of this group, in particular drawing attention to the delimitation and status of the many entities discernible within what I treat below as the *B. ciliaris* complex (as distinct from the *B. ciliaris* group). For example, Bentham (1867) recognised six varieties within *B. ciliaris*, with Ostenfeld (1921, p. 133) subsequently commenting:

I think that there are several species under what is called “*B. ciliaris*” [by Bentham], and several of Bentham’s varieties (*l.c.* 519) deserve to be more closely examined and separated from the main species.

Subsequently Davis (1948) made some changes, recognising four varieties but, as cytological investigations have indicated, many members of the *B. ciliaris* complex exhibit various levels of ploidy and are apomictic, and Davis’s taxonomy of the complex is not a true reflection of the number of taxa within it (see, for example, Carter 1978a, Watanabe & Short 1992).

I have not completed a thorough investigation of either *B. blackii* or *B. tesquorum* and do not provide

descriptions; they appear to be very close but distinct taxa.

# 16. *Brachyscome blackii* G.L.R.Davis

Proc. Linn. Soc. New South Wales 73: 207, Fig. 76, 83, pl. vi, map 24 (1948); E.L.Robertson, J.M.Black’s Fl. S. Austral., 853, Fig. 1152 J (1965, rev. edn); Jessop, Fl. Centr. Austral. 369 (1981); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1448, Fig. 654B (1986); E.Salkin et al., Austral. Brachyscomes 54 (1995). — **Type citation**: “Reedy Creek, Central Australia ... 1894, R. Tate, Horn Expedition (AD).” **Holotype**: AD 98419314 p.p. **Possible isotype**: AD 97621452, ex ADU.

**Distribution.** Arid regions of Western Australia (Hammersley Range east to the Gibson Desert and Warburton Region), Northern Territory (below c. 23°S) and the north-west of South Australia.

**Typification.** The possible isotype (AD 97621452, ex ADU) is a reasonable match with, and has the same printed ADU label, as the holotype. However, it is devoid of specimen information and is also a good match with other collections mounted with the holotype, i.e. those apparently collected by Tate from Tempe Downs, Glen Helen Gorge and Palm Creek.

**Notes.** The pericarp appears to have two vascular bundles and the cells of the testa have u-shaped thickening (P.K. Latz 1906).

## *Specimens examined.*

**WESTERN AUSTRALIA:** Giles, 20 June 1958, J.B. Cleland (AD 96444170); Giles, 20 June 1958, G.M. Chippendale (DNA, PERTH); Giles, 8 July 1958, R. Hill & T.R.N. Lothian 898 (AD); Terhan Rockhole, Warburton road, 4 July 1963, A.S. George 4699 (PERTH); Hammersley Range, Sept. 1958, P. McMillan (PERTH 409960).

**NORTHERN TERRITORY:** Palm Valley, 20 July 1954, G.M. Chippendale NT15 (DNA, NSW); 38½ miles SW Tobermorey Hmsd, 20 Sept. 1956, G.M. Chippendale NT 2761 (CANB); summit of Mt Gillen, 9 Aug. 1926, J.B. Cleland (AD 97233224); Palm Valley, 17 Aug. 1929, J.B. Cleland (AD 97233204, AD 97233205); Ormiston Gorge, 19 June 1972, C.R. Dunlop 2612 (BRI, DNA, NSW); Mt Riddock Stn., 13 Sept. 1973, N.M. Henry 913 (DNA); James Range, March 1885, H. Kempe (MEL 220847); valley N of Larapinta Waters, 27 Dec. 1971, P.K. Latz 1906 (CANB, CBG, DNA); gorge 33 km NW of Henbury homestead, 29 April 1982, P.K. Latz 9048 (DNA); Rainbow Valley, 30 Aug. 1986, G.J. Leach 758 (DNA); Palm Valley, 16 July 1958, R. Hill & T.R.N. Lothian 949 (AD); sewage farm, 2–3 miles west Alice Springs, 16 May 1967, A.O. Nicholls 548 (DNA); Palm Creek, 1894, R. Tate (AD 97448179, AD 98419314 p.p., NSW 15475); Tempe Downs, 1894, R. Tate (AD 98419314 p.p.); Glen Helen Gorge, 1894, R. Tate (AD 98419314 p.p., includes *B. tesquorum*); Ormiston Pound, 23 May 1975, J. Wauchope (DNA A78178); Palm Valley, 16 Sept. 1965, J.H. Willis (MEL 2035103); Mt Sonder, 20 July 1966, J.H. Willis (MEL 2035104); 41.2 km from Hermannsburg Mission, 6 Oct. 1981, L.D. Williams 12116 (AD).

**SOUTH AUSTRALIA:** Cheesman Peak, 28 Aug. 1978, W.R. Barker 2938 (AD); “N.W. Expedition”, 1903, H. Basedow (NSW 15476); Mt Lindsay inselberg, 31 Aug. 1978, N.N. Donner 6437 (AD); Mt Harriet, 5 Sept. 1963, H.J. Eichler 17262 (AD); Mt Morris. 7 Sept. 1963, H.J. Eichler 17354

(AD); Ernabella, 31 July 1966, *F.T. Turvey* (AD 97628006, AD 97628021); Musgrave Ranges, 11 Aug. 1968, *F.T. Turvey* (NSW 230308, seemingly part of ?*M.G. Barrow* 15611); Mt Morris, 7 Sept. 1963, *D.J.E. Whibley* 1026 (AD); Mt Lindsay inselberg, 31 Aug. 1978, *D.J.E. Whibley* 6553 (AD); Mt Moulden, 1 Sept. 1978, *D.J.E. Whibley* 6667 (AD).

### 17. *Brachyscome ciliaris* (Labill.) Less.

Syn. gen. Compos. 192 (1832) ("*Brachycome*"); Benth., Fl. Austral. 3: 518 (1867) ("*Brachycome*"); Ostenf., Biol. Meddel. Kongel. Danske Vidensk. Selsk. 3(2): 132 (1921) ("*Brachycome*"); J.M.Black, Fl. S. Austral. 1st ed. 586, Fig. 248 (1929) ("*Brachycome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 220, Fig. 105 & 106, pl. vi, map 29, pl. xi, no. 2 (Oct. 1948) ("*Brachycome*"); E.L.Robertson, J.M. Black's Fl. S. Austral., 855, Fig. 1152T & U (1965, rev. edn) ("*Brachycome*"); J.H.Willis, Handb. Pl. Victoria 2: 673 (1973) ("*Brachycome*"); Grieve & Blackall, How Know W. Austral. Wildfl. 804 (1975) ("*Brachycome*"); G.M.Cunningham et al., Pl. W. New South Wales 652, Fig. 64u & v (1981) ("*Brachycome*"); Jessop, Fl. Centr. Austral. 371 (1981) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1450, Fig. 654F (1986) ("*Brachycome*"); Stanley in Stanley & E.M.Ross, Fl. SE Queensl. 2: 508, Fig. 71A (1986); J.Everett in G.J.Harden, Fl. New South Wales 3: 162 (1992) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 68 (1995); P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 842, Fig. 170c (1999). — *Bellis ciliaris* Labill., Nov. Holl. Pl. 2: 56, t. 207 (1806). — **Type citation**: "in terra Van-Leuwin." **Lectotype**: New Holland, 1806, *Labillardiere* (P p.p., per Webb). (Davis 1948, p. 221, pl. xi, Fig. 2). **Isolectotypes**: (P p.p., per Webb), Fl-Webb, n.v.

*Brachyscome drummondii* Walp., Repert. Bot. Syst. 2: 584 (1843) ("*Brachycome*"). — **Type citation**: "crescit in Nova Hollandia ad Swan River (v.s. sp.)." See notes below.

*Brachyscome lanuginosa* Steetz in Lehm., Pl. Preiss. 1: 427 (1845) ("*Brachycome*"). — *Brachyscome ciliaris* var. *lanuginosa* (Steetz) Benth., Fl. Austral. 3: 519 (5 Jan. 1867) ("*Brachycome*"), p.p., at least excluding Darling Desert. — **Type citation**: "In promontorio Cape-Riche, mense Nov. 1840. Herb. Preiss. No. 85." **Lectotype**: In Nova Hollandia (Swan River Colonia) in prom. horio Cape Riche, *Preiss* 85 (MEL 116227 p.p.). (Davis 1948, p. 223, Fig. 94). **Isolectotypes**: G 00222787 (per JSTOR), LD 1002786 (per JSTOR), MEL 116227 p.p.), S 07-7482 (per JSTOR).

*Brachyscome billardieri* Benth., Fl. Austral. 3: 518 (1867) ("*Brachycome Billardieri*"), nom. illeg. (later homonym of *B. billardieri* Cass.). — **Type citation**: "W. Australia, *Drummond*, 5th Coll. n. 374." **Lectotype**: Western Australia, *J. Drummond* 374 (MEL 2035102, fruit absent). (Davis 1948, p. 210). **Isolectotypes**: G 00222785 (mature fruit), K 000882341, 000882342, PERTH (fruit), W (flowers only).

*Brachyscome ciliaris* var. *glandulosa* Benth., Fl. Austral. 3: 519 (1867) ("*Brachycome*"). — **Type citation**: "S. Australia and W. Australia, *Drummond*, 4th Coll. n. 210." **Lectotype**: Western Australia, *Drummond* 210 (MEL 116228). (Davis 1948, p. 224). **Isolectotypes**: G 00222786 (per JSTOR), K 000882321, TCD, W.

*Brachyscome ciliaris* var. *grandiflora* Benth., Fl. Austral. 3: 519 (1867) ("*Brachycome*"). — **Type citation**: "W. Australia, *Drummond*." **Apparent type**: Swan River, *Drummond* 38 (K 000882320), see note below.

*Brachyscome ciliaris* var. *subdissecta* Benth., Fl. Austral. 3: 519 (1867) ("*Brachycome*"). — **Type citation**: "Victoria and S. Australia." **Lectotype**: Crystal Brook, Oct.1851, *F. Mueller* (MEL 116226). (Davis 1948, p. 221). **Remaining syntype**: Wimmera, *Dallachy* (K 000882322).

*Brachyscome ciliaris* var. *subintegra* Reader, Victorian Naturalist 23: 25 (1906) ("*Brachycome*"), nom. nud.

*Brachyscome ciliaris* var. *subintegrifolia* G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 225, Fig. 96, pl. vi, map 29 (1948) ("*Brachycome*"). — **Type citation**: "Holotype: Tamworth, 4.42. Consett Davis (NSW). Paratypes: Five, l.c. (MEL, BRI, AD, PERTH, NSW)." **Holotype**: NSW 230551 p.p. **Isootypes**: AD 98419313, HO n.v., MEL 116229, NSW 230551 p.p., PERTH.

*Brachyscome ciliaris* var. *brachyglossa* Gauba, Victorian Naturalist 65: 185, Fig. 4d (9 Dec. 1948) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1450 (1986) ("*Brachycome*"); P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 844 (1999). — **Type citation**: "Loveday, in locis arenosis (TYPI-leg. Gauba, 6.12.44)." **Holotype**: MEL 116179 & 116180, see note below.

*Brachyscome lyrifolia* J.M.Black, Trans. Roy. Soc. S. Austral. 61: 249, t. xiv, Fig. 1 (24 Dec. 1937) ("*Brachycome*"). — *Brachyscome ciliaris* var. *lyrifolia* (J.M.Black) G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 225, Fig. 95 (1948) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1450 (1986) ("*Brachycome*"). — **Type citation**: "South Australia – Chambers' Creek, Flinders Range, June, 1937, *E.C. Black*; Central Australia – Mount Gillen, Aug., 1936, *E.C. Black*." **Lectotype**: Chamber's Creek, Flinders Ranges, vi.1937, *E.C. Black* (MEL 116182). (Davis 1948, p. 225). **Isolectotypes**: AD 98419307 p.p. (ex herb. J.M.Black), K, NSW 228812. **Remaining syntypes**: Mt Gillen, Aug. 1936, *E.C. Black* (AD 98419307 p.p.), of *B. blackii* G.L.R.Davis.

*Brachyscome dimorphocarpa* G.L.R.Davis, Muelleria 1: 112, Fig. 4-7 (1959) ("*Brachycome*"). — **Type citation**: "Holotype: Bon Bon Station to Kingoonya, South Australia. 'Low wash in red sand country with myall (*Acacia sowdenii* Maiden)', 11.10.1955, *N.T. Burbidge* and *M. Gray* (CANB. No. 4653). Paratypes: Same collection (MEL; NSW; ADW; BRI)." **Holotype**: CANB 39301. **Isootypes**: AD 98419312, BRI 6439, CANB 39107, MEL 2035112, NSW 230550. See note below.

Annual or perennial herb or subshrub, major branches ascending to erect, glabrous or with a sparse to dense indumentum of stalked glandular hairs and/or coarsely septate or fine and cottony eglandular hairs. Leaves cauline, entire or 1- or 2-pinnatisect or pinnatilobed, glabrous or with glandular and eglandular hairs, lobes blunt to mucronate. *Involucre* 2.6–7.6 mm diam. *Bracts* 12–30, of c. equal length and in about 1 row, elliptic to narrowly elliptic, lanceolate, obovate to oblanceolate, narrowly rhombic, obtusulate to narrowly obtusulate, 2.2–4.8 mm long, 0.5–3.8 mm wide, mostly herbaceous but with narrow, mostly slightly divided, scarious margins and apex which are often purplish, the apices in bracts commonly subacute, sometimes rounded or acuminate. *Receptacle* barely convex to subconical, glabrous, often honeycombed. *Florets* 38–172 per capitulum. *Ray florets* 20–91; corolla mostly 4.1–8.7 mm long, 0.6–1.2 wide, but sometimes inconspicuous and barely 2 mm long, white, mauve

or purplish. *Disc florets* 18–82; corolla tube 1.2–2.4 mm long, 0.4–0.8 mm diam., 5-lobed, rarely 4-lobed. *Stamens* 5; microsporangia 0.57–1.18 mm long, any pollen mostly sterile, terminal apical appendage commonly absent or barely developed but distinct in some entities, occasionally stamens not developed. *Style* 1.66–2.89 mm long, arms 0.81–1.21 mm long. *Cypselas* commonly dimorphic, with those of the ray unwinged and those of the disc winged, but monomorphic (either winged or unwinged) in some entities, sometimes only tending to be dimorphic (as in var. *brachyglossa*) with cypselas of the ray florets having a poorly developed wing compared to those of the disc; ab/adaxial ribs 2, sclerenchymatous; testa cells in both winged and unwinged cypselas with u-shaped thickening (*A.C. Beauglehole* 83560; *P.S. Short* 1158, 3352, 3671, 3698 & 3752). *Unwinged cypselas* laterally compressed, ovate, with broad, smooth, entire ab/adaxial margins, lateral surfaces usually with tubercles and apically-curved eglandular hairs but tubercles sometimes absent; carpopodium annular. *Winged cypselas* thin, commonly obovate in outline, mostly discolorous, with the cypsel body brown and the vascular ribs and wing-like margins whitish or yellowish; cypsel body glabrous or with apically-curved eglandular hairs, smooth or tuberculate; wing-like margins entire to dissected, flat to somewhat inrolled, apically forming or not forming a notch within which sits the corolla, wing margins with apically-curved eglandular hairs; carpopodium annular. *Pappus* absent or a short, whitish crown of basally fused bristles c. 0.05–0.4 mm high. *Chromosome numbers*:  $n = 9, 18, 36$ ;  $2n = 27, 36$ . **Fig. 18–20.**

*Distribution.* Tasmania, where it is uncommon, and all mainland States and the Northern Territory.

*Habitat.* Found in an array of temperate to semi-arid or arid habitats, including the margins of saline lakes, open *Acacia*-dominated or saltbush-dominated shrubland, mallee-eucalypt communities, *Callitris*-dominated woodland with sandy loam, *Casuarina*-dominated woodland with heavy clay loam, and open forests of red gum (*Eucalyptus camaldulensis*).

*Reproductive biology.* Davis (1964) reported that entities within this complex are agamospermous and display the *Antennaria*-type of diplospory. Turner (1970) noted that tetraploid entities he examined were presumably apomictic and Carter (1978a) also recorded widespread failure of plants to enter meiosis at all, with disintegration of pollen mother cells or virtually complete asynapsis and failure to finish meiotic division. Severe male meiotic irregularities in members of this complex were also reported by Watanabe & Short (1992), observations which were also reflected in estimates of pollen sterility in various populations, with 100% sterility being common. However, plants of var. *lyrifolia* and specimens allied to that taxon most certainly produce fertile pollen, as do some other entities here included within the complex.



**Fig. 18.** *Brachyscome ciliaris*, near Bourke, N.S.W. — *P.S. Short* 3559.

*Cytology.* De Jong (1963), Smith-White et al. (1970), Turner (1970), Carter (1978a), Watanabe & Short (1992) and Watanabe et al. (1996b) have reported chromosome numbers for this complex, with determinations of  $n = 9, 18$  and  $36$  and  $2n = 27$  and  $36$  being reliably recorded. As noted in Watanabe & Short (1992) determinations of  $6x$  and  $9x$  by Carter (1978a) are likely to be erroneous. Most chromosome reports (nearly 60) are in the papers for which Watanabe was the senior author and include entities from all mainland States. The distribution of diploid and higher ploid entities in this complex are illustrated in Watanabe & Short (1992, Fig. 2), although it excludes subsequent determinations, mostly from W.A., published in Watanabe et al. (1996b). The tetraploid number ( $2n = 36$ ) predominates in the reports and is recorded throughout the range of this complex.

An idiogram of somatic metaphase chromosomes of an entity from Fitzgerald River in south-western Western Australia (Watanabe 174,  $2n = 18$ ) was presented by Watanabe et al. (1999, Fig. 41). This may be of *B. ciliaris* s.str.

Under Davis's concept of taxa, both var. *ciliaris* and var. *lanuginosa* exhibit different ploidy levels. Preliminary studies suggest that this will still be the case when the additional taxa currently subsumed under these names are circumscribed on morphological grounds.

*Notes.* A highly polymorphic, apomictic complex within which there are undoubtedly quite a number of taxa, both described and undescribed. There is a range of variation in regard to features such as longevity, indumentum (e.g. presence or absence and structure of eglandular hairs, size, structure and placement of stalked glandular hairs), leaf morphology (degree of dissection and shape and size of lobes), size of ray corollas, fruit morphology (monomorphic or dimorphic, size, development of tubercles, size and distribution of the eglandular hairs, etc.) and the degree of development of the pappus. Most, if not all, of the taxa which have been formally named and which are cited above in synonymy are probably



Fig. 19. *Brachyscome ciliaris*, near Balladonia Roadhouse, W.A. — P.S. Short 3789.



Fig. 20. *Brachyscome ciliaris*, 66 km S of Tibooburra, N.S.W. — P.S. Short 3628.

worthy of recognition, but I have refrained from this as more thorough studies are generally required to ensure that they are accurately delimited. I make further notes on their status and circumscription below under each name; when doing this I refer to them under the name by which they were first described.

When adding determinavit slips to specimens I have usually only indicated that they belong to the *B. ciliaris* complex, only occasionally indicating whether specimens belong to *B. ciliaris* s.str. (a few specimens from W.A.), and when I'm confident that they are representative of one of the named taxa, albeit the status and final circumscription may be unclear.

In regard to checklists and regional floras I clearly favour recognition of a *B. ciliaris* complex with the synonymy as provided above and an appropriate explanatory note. However, several names can be applied with little reservation. In checklists I would include var. *brachyglossa* (S.A., Vic.), var. *lyrifolia* (S.A.) and var. *subintegrifolia* (Qld, N.S.W., Vic., ?S.A.), while both var. *ciliaris* and var. *lanuginosa* can only be confidently referred to Western Australia.

Most specimens included here have dimorphic cypselas, those of the ray unwinged and usually prominently tuberculate, those of the disc winged and lacking tubercles. However, there are some specimens that possess monomorphic fruit, at least in regard to the absence or presence of winged margins. These include:

(a) a specimen *G.J. Keighery 11548* (PERTH) from Juana Rock in Cape Arid National Park only has unwinged cypselas.

(b) a specimen *C.A. Gardner 7947* (PERTH), vegetatively different from the above but also with all cypselas in two of the plants on the sheet being unwinged; in the other vegetatively identical plant on the sheet the cypselas are dimorphic (i.e. unwinged ray cypselas and winged disc cypselas). Davis saw this specimen subsequent to publication of her revision

(Davis 1948) and in an undated annotation attached to the specimen recorded that

this variation has been already recorded (Davis, 1948, p. 223) and until recently I had only seen it in isolated specimens & was considering describing it with specific rank. However, this record, & a similar one from N.S.W., suggests that some genetical mechanism is responsible for the sporadic appearance of plants with monomorphic fruits in a normal population, & consequently cannot be recognised as a distinct species.

The specimen from N.S.W. alluded to by Davis in this note is presumably the Minchin specimen (MEL 692594) collected in 1887 from near the junction of the Murray and Darling rivers. In that specimen there are three elements with dimorphic fruit and two elements which appear vegetatively identical but have only unwinged fruit. In her note attached to the specimen Davis again suggested that the variation occurs sporadically in a population with otherwise dimorphic fruit.

(c) the specimens *P.S. Short 3880* (MEL, plus duplicates), *A.S. George 6865* (PERTH), *A.S. George 7010* (PERTH), and *A. Morrison* (PERTH 410454; referred to by Davis 1948, p. 223) from south-western W.A. are representative of what appears to be a perennial herb and have only unwinged cypselas. In a vegetatively similar specimen, *Salkin ADSG 76* (MEL) from Cowallup Reserve (also south-western W.A.) the fruit of the disc florets are not just unwinged but also lack or have poorly developed tubercles on their lateral surfaces.

(d) two specimens, *E.T. Muir* (MEL 529554) and *A.C. Beaughole 86543* (MEL), from the Wimmera region of western Victoria display monomorphic fruit, the cypselas being unwinged and almost glabrous, with very short eglandular hairs and no or barely-developed tubercles. In keeping with most members of this complex anthers lack a terminal appendage but, unlike most others, appear to produce much pollen.

(e) a specimen *R.D. Royce 5573* (PERTH) collected near Zanthus in W.A. also appears to have only mono-

morphic fruit but in this case all are winged. The ray florets are also very small, dried corollas being only c. 1.5 mm long.

The statement in Watanabe & Short (1992, p. 467) “that specimens with reduced ray florets are mutant forms undeserving of formal recognition” is, I now suspect, generally incorrect. While there may be examples where reduced rays in a few plants in a population of otherwise identical individuals exist, there are also collections of seemingly vegetatively distinctive entities with only short rays, such as those attributable to var. *brachyglossa*. Others, such as *C.R. Alcock 1122* (AD), *J. Carrick 3773* (AD) and *J.B. Cleland* (AD 96404174) represent what may be a perennial taxon with highly divided leaves with near-linear lobes and reduced florets. They were collected from Eyre Peninsula, but specimens of the same or a similar entity have also been gathered from elsewhere in South Australia and Victoria; the name var. *subdissecta* appears to apply to some or all of these individuals.

*Typification and comments regarding Bellis ciliaris.* Labillardière, as a member of D’Entrecasteaux’s voyage sent in 1791 to search for news of the La Pérouse expedition, visited both Tasmania (twice) and Western Australia. The latter locality, referred to in Labillardière (1804–1806) as “terra Van-Leuwin”, was visited in December 1792, with specimens gathered from one of the islands of the Archipelago of the Recherche, probably Observatory Island, and on the mainland surrounds of Esperance Bay, including the vicinity of Pink Lake (Duyker 2003). Nelson (1975) has noted that some of Labillardière’s specimens recorded in his publication as coming from ‘terra Van-Leuwin’ were in fact from elsewhere and not collected by Labillardière, but I have no reason to believe that this is the case for *Bellis ciliaris*. I have not examined type specimens of *B. ciliaris* and, as such, am not absolutely certain as to the application of the name. However, from the published photograph (Davis 1948) of the sheet in P containing the lectotype and isotype specimens, examination of Labillardière’s original description and plate, and the information supplied by Humbert to Davis that the peduncle and bracts are glandular-pubescent, I believe it reasonable to consider specimens such as *Anon.* (MEL 692476) from ‘grassy sand flats, Esperance Bay’, and *Anon.* (MEL 116240) from “grassy flats inland Esp. Bay and C. Le Grand”, both of which were seen by Bentham, to be of this species. Other specimens appearing to be of the same taxon are *P.S. Short 4126* from Cape Riche, a population for which a chromosome number of  $n = 9$  has been determined. Allowing for the presence of a few cottony eglandular hairs in the leaf axils – seemingly absent from the aforementioned specimens – then other specimens from Cape le Grand, West Cape Howe and elsewhere along the south-west coast and near-coast are probably of *B. ciliaris* s.str. I doubt that the species, in the strict sense, is found elsewhere.

The general habit and leaf shape is evident in both the original description and in the plate of the lectotype specimen in Davis (1948), the full references to which are cited above. In all florets no pappus develops; any circular pappus-like structure appears to me to be no more than the remnant base of the corolla tube after it falls from mature fruit.

*Typification and comments regarding B. ciliaris var. brachyglossa.* Gauba did not use a numbering system and the type material he referred to in his publication is distributed over two sheets consecutively numbered as MEL 116179 (a single plant and a branchlet) and MEL 116180 (a single plant) and each with a handwritten label in Gauba’s hand, stating place of publication and locality details as given in the protologue; thus there is no doubt that the elements on both sheets form part of a single gathering and are the material upon which he based the name var. *brachyglossa*. At the time of their being mounted and despite the different sheet numbers someone, but not Gauba, also cross-referenced the individual sheets as being “Sheet 1 of 2” and “Sheet 2 of 2”, such cross-labelling also indicating that they should be considered to constitute a single specimen (Art. 8.3, Ex. 4), the holotype of var. *brachyglossa*.

The combination of highly reduced ray corollas and a distinctive leaf morphology indicate that this is a taxon well-worthy of recognition. The near-subamplexicaul leaves are c. 4–11 mm long, 2–3 (9) mm wide and have 1–4 mucronate teeth or entire lobes along each margin. At least the upper branches, leaves and bracts have a moderately dense indumentum of very short, stalked glandular hairs. Originally described from Loveday, S.A., it also occurs in northern Victoria, the first collection having been gathered by F.M. Reader from Borung in 1903.

I have previously indicated (Short 1999) that var. *brachyglossa* has, or almost has, monomorphic cypselas. Having more closely examined the outermost cypselas of a mature capitulum of the holotype it is evident that they are unwinged, while most inner cypselas are manifestly winged on both the abaxial and adaxial margins. However, there are loose fruit within the fragment packet that have one margin winged and the other not or barely so, indicating that there is some gradational development, not necessarily a definite switch in the development from unwinged to winged fruit.

*Typification and comments regarding B. ciliaris var. glandulosa.* Davis (1948, p. 221) cited var. *glandulosa* as a synonym of var. *ciliaris* but in subsequent discussion (pp. 222, 224) selected *Drummond 210* as the lectotype of the name var. *glandulosa* and, because that specimen is ‘slightly woolly-hairy’, referred it to var. *lanuginosa* (Steetz) Benth. I suspect it is a taxon worthy of recognition.

*Typification and comments regarding B. ciliaris var. grandiflora.* Notes made at K indicate that I believed at the time (?2005) that *Drummond 38* held at that

institution should be chosen as the lectotype specimen but, in the absence of thorough notes, I refrain from doing so. The collection has almost mature, dimorphic fruit.

*Typification and comments regarding B. ciliaris* var. *subdissecta*. The lectotype specimen, although vegetatively in good condition, generally lacks well-developed capitula and florets although there are some mature and near-mature cypselas in the fragment packet. It is also evident from a single ray floret observed in the fragment envelope and one in a capitulum that ray corollas are very short, the entire corolla being less than 1.5 mm long. This distinctive feature was not recognised by either Bentham (1867) or Davis (1948). The application of the name needs to be further investigated, but a preliminary study of herbarium specimens suggests that the taxon may prove to be widespread in South Australia and perhaps elsewhere.

*Typification and comments regarding B. ciliaris* var. *subintegrifolia*. A poorly collected but generally distinct taxon found in south-eastern Queensland, eastern New South Wales, northern Victoria and seemingly South Australia, those from the last State being *A.M. Ashby* 738 (AD) from Mambray National Park and *A.G. Spooner* 6015 (AD) from Napperby Gorge. These specimens lack mature fruit and if they are of this taxon there is a major disjunction between them and populations in the other States.

This taxon can be vegetatively similar to *B. dalbyensis*, from which it is easily distinguished by its dimorphic fruit. The narrow ray cypselas are also similar to the cypselas of that species in being covered with long, apically-curved eglandular hairs but when fully mature the fruit surfaces in var. *subintegrifolia* are tuberculate, not smooth.

The specimen *K. Watanabe* 15, for which a diploid chromosome number of  $2n = 36$  was recorded (Watanabe et al. 1996b, as *B. ciliaris* complex) appears to be representative of this taxon.

*Typification and comments regarding B. billardieri*. The lectotype specimen chosen by Davis (1948) for this illegitimate name lacks fruit. Dimorphic cypselas are evident in several of the isolectotypes.

Drummond's specimen is vegetatively distinctive and may prove to be representative of a taxon worthy of recognition. It was possibly collected from Cape Riche. Robert Brown's specimen (CANB 279078) from Goose Island Bay off Cape Arid is similar.

*Typification and comments regarding B. dimorphocarpa*. There are two sheets of *N.T. Burbidge* & *M. Gray* CANB. No. 4653 at CANB but only one (CANB 39301) is labelled by Davis as being the holotype and named in her hand as *B. dimorphocarpa*. It consists of a single plant. The duplicate, CANB 39107, which consists of several elements does not appear to have been consulted by her when describing this species, the only annotation

in what appears to be her hand being the name *B. ciliaris*. There is also no indication in her publication that she saw this specimen, it not being cited along with other specimens she listed as paratypes. I accordingly consider it to be an isotype rather than part of the holotype. In a correction to Davis's original description (Anonymous 1967) it was reported that the isotype of *B. dimorphocarpa* in the herbarium of Waite Agricultural Research Institute (ADW) had been destroyed by a fire at Armidale.

Cooke (1985, p. 273) recorded that

of a total of 266 collections seen, the only two specimens agreeing with the description of *B. dimorphocarpa* (the type specimen and *L.D. Williams* 7225) with regard to the achenes, differed widely from each other in vestiture and leaf shape, and cannot be maintained as a distinct entity.

I do not believe that *B. dimorphocarpa* is the same as *B. ciliaris* s.str. but am uncertain as to how it should be circumscribed. For example, vegetatively similar annual plants such as represented by *P.S. Short* 4121 (Paynes Find area, W.A.) agree quite well with the type of this species except that the disc florets have a comparatively well-developed pappus; others such as represented by *P.S. Short* 4219 (near Cue, W.A.) are also vegetatively similar to the type of *B. dimorphocarpa* and seem to differ only in that the wings of the cypselas of the disc florets are not curved but flat. Both of the entities represented by *P.S. Short* 4121 and 4219 are widespread and the available specimens suggest that plants in many populations are uniform in regard to cypselas morphology. However, there are also populations in which there are plants which have manifestly curved cypselas with a distinct pappus and plants in which the wings of the cypselas are flat and the pappus barely developed. Such specimens, all from W.A. but perhaps also found further east include *P.S. Short* 3837 (mixed) and *K. Watanabe* 163 (mixed) and – where the mixed nature of the specimens was ascertained before plants were mounted – *P.S. Short* 3800 & 3800a and *P.S. Short* 4116 & 4116a. Were it not for the known apomictic nature of these entities I may have formally named them, but believe that they should be studied further before any such steps are considered.

Note that for *K. Watanabe* 163, a chromosome number of  $2n = 36$  was determined and published before it was realised that the collection contained two entities; it is not known whether the number pertains to one – and if so, which one – or both of them.

*Typification and comments regarding B. drummondii*. Steetz (1845) indicated that he saw an authentic specimen in B, apparently one gathered by Drummond from the Swan River Colony, and cited *Preiss* 87 as being of the same species. Of the *Preiss* specimen, he stated that it did not differ from the authentic specimen although in all parts, with the exception of the capitulum, it was about twice the size. Bentham (1867), without comment, placed this name in synonymy under *B. ciliaris* and Davis followed Bentham's lead,

stating that Walpers's "description agrees quite satisfactorily with this species" (Davis 1948, p. 223). I have viewed specimens of *Preiss* 87 at W and MEL (Steetz herbarium). It has a perennial rootstock and dimorphic fruit. Assuming any authentic type material is no longer extant, a neotype specimen can be chosen for the name *B. drummondii*, with either *Preiss* 87 or a Drummond specimen matching the original description being the only candidates that should be considered. I have refrained from doing this as it should not be done without resolution of the *B. ciliaris* complex in south-western W.A. and a more thorough search for the specimen seen by Walpers.

*Typification and comments regarding B. lanuginosa.* Originally described as a species but reduced to varietal status by Benthams, a rank accepted by Davis (1948, p. 223). Following Davis, the name *B. ciliaris* var. *lanuginosa* applies to perennial specimens which have a cottony or woolly indumentum and are found "throughout Australia south of the Tropic of Capricorn". Such specimens exhibit variation in features such as habit and leaf morphology and I suspect that the name will be shown to strictly apply to a taxon, probably deserving of the original specific rank, confined to south-western W.A.

*Typification and comments regarding B. lyrifolia.* This is a basally woody herb or subshrub with trailing to weakly ascending branches, with a dense indumentum of fine, shortly-stalked, glandular hairs. The leaves basally taper and have 5 (7) broad lobes which are entire or 1- or 2-toothed; the ray florets are up to c. 7 mm long and described by collectors as being "pale mauve" or "deep pink-mauve". Unusually for members of this complex fertile pollen is present in the anthers of the disc florets while the cypselas are typically dimorphic, with those of the ray florets tuberculate, those of the disc flat and narrowly winged. A pappus is short or barely developed. Strictly defined, it appears to be confined to the Flinders Ranges, S.A.

In regards to typification of the name there is no doubt that the lectotype specimen in MEL chosen by Davis once formed part of Black's herbarium, being annotated with the name, locality and date in Black's hand. Davis saw specimens in Black's own herbarium and annotated two elements as "paratypes". That she didn't select either of them as the lectotype specimen is perhaps not surprising. As is usual for Black's collections the specimens are messily displayed with a mix of annotated elements and illustrations and, at the time she saw them, were still part of his private herbarium and not, as they are now, held in AD. The NSW syntype specimen is also annotated by Black.

This taxon was first described as a species but subsequently given varietal rank by Davis (1948), a rank which was maintained by Cooke (1986) and Watanabe & Short (1992) and is one which I maintain in referring to it here. In contrast, Watanabe et al. (1996a) and

Watanabe et al. (1999) recognised it as a species. Perhaps the specific rank is appropriate, but the circumscription of the taxon needs further examination. In the strictest sense, the taxon is represented by specimens such as *T.R.N. Lothian* 1108 (AD), *R. Schodde* 835 (AD, CANB) and *D.J.E. Whibley* 3927 (AD), all of which are identical to the type specimen and, like it, are from the type locality, Chambers Gorge in the Flinders Ranges. In these specimens the leaves become smaller towards the apices of the branches but remain essentially the same shape throughout the plant. As well as in the original illustration published by Black, typical var. *lyrifolia* is illustrated in Salkin et al. (1995, p. 71). Outside of the gorge there are other collections, such as *Robjohns* (AD 96826051) and *W. Greuter* 18673 from the Arkaroola area which have more divided leaves but probably belong with var. *lyrifolia* s.str. However, specimens exhibiting more highly divided leaves with narrow lobes, e.g. *L.A.R. Haegi* 2714 from Wilpena Pound and others from Parachilna, are found elsewhere within the Ranges and their relationship with var. *lyrifolia* needs to be further examined.

Chromosome number reports of  $n = 9$  for var. *lyrifolia* (Smith-White et al. 1970; Carter 1978a; Watanabe & Short 1992) and the idiogram of somatic metaphase chromosomes published in Watanabe et al. (1996a, Fig. 12, as *B. lyrifolia*) and Watanabe et al. (1999, Fig. 24, as *B. lyrifolia*) are all from specimens from Parachilna which, as noted above, vegetatively differ from var. *lyrifolia* s.str.

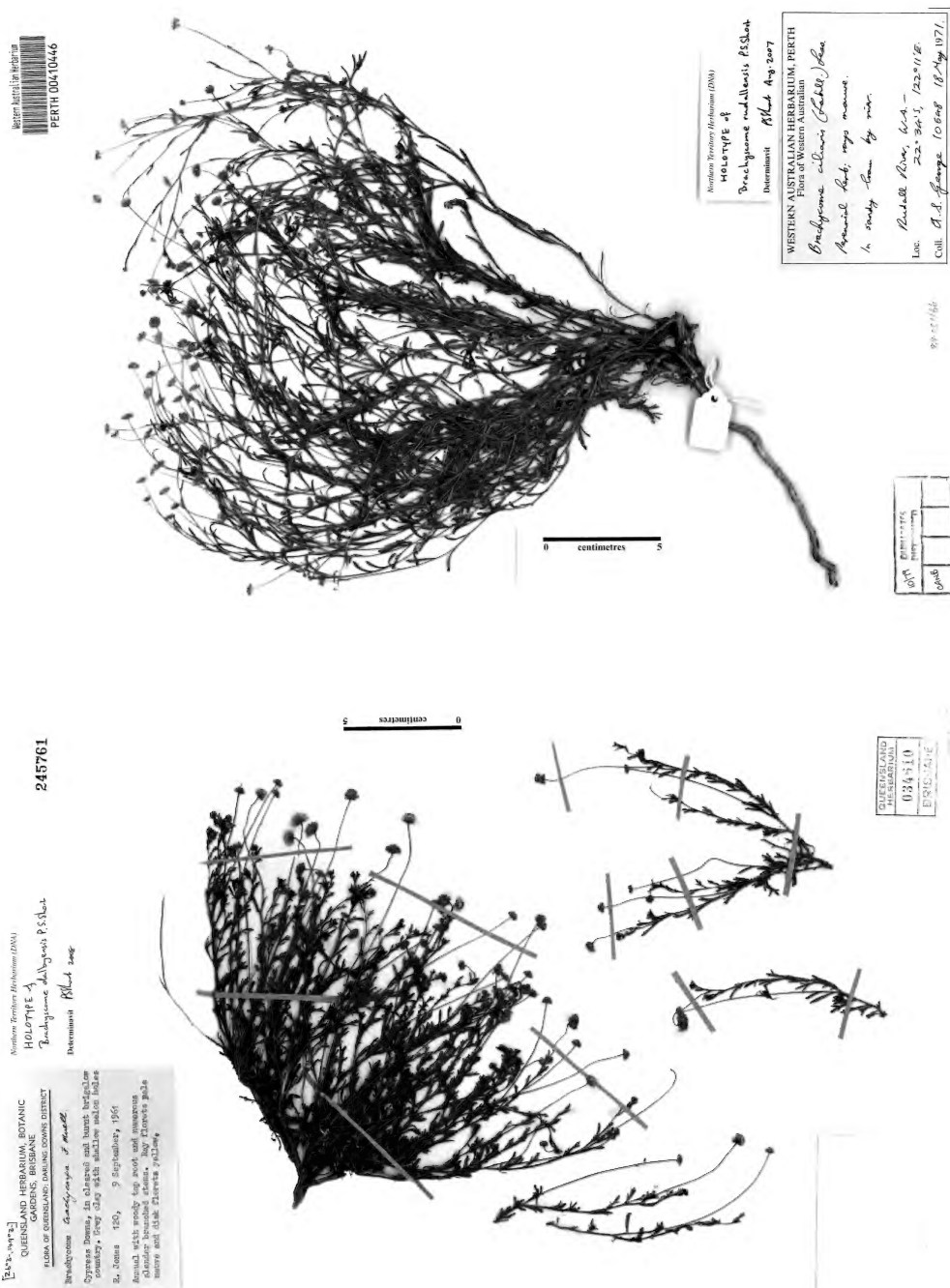
#### 18. *Brachyscome dalbyensis* P.S.Short, sp. nov.

**Type:** Queensland. Cypress Downs [N of Yuleba], in cleared and burnt brigalow country, grey clay with shallow melon holes, 9 Sept. 1961, *R. Jones* 120 (**holotype:** BRI; **isotype:** CANB 114744).

[*Brachyscome trachycarpa* auct. non F.Muell.: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 174. Fig. 36, pl. vi (1948) ("*Brachyscome*"), p.p. as to Qld & at least C.W. Winders specimen from N.S.W.; Stanley in Stanley & E.M. Ross, Fl. SE Queensl. 2: 513, Fig. 710 (1986); E.Salkin et al., Austral. Brachyscomes 238 (1995), p.p., as to Qld specimens only.]

Perennial *subshrub* resprouting from a thickened taproot, c. 15–30 cm tall, branches erect, stiff, smooth or somewhat ribbed, glabrous or with stalked glandular hairs c. 0.03–0.08 mm long and at least sometimes (e.g. *R. Jones* 3245) with larger stalked glandular hairs to c. 0.16 mm long with (on drying) flattened triangular bases, all glandular hairs usually scattered to moderately dense (particularly on young shoots) or rarely dense (*M.D. Crisp* 3031) throughout much of the plant; eglandular, uniseriate, septate cottony hairs absent or sparse. *Leaves* both linear or linear-oblongate and entire and (1.5) 5–20 mm long, 0.2–0.8 mm wide and pinnatifid to pinnatisect and to c. 35 mm long, the frequency of entire and divided leaves variable within a specimen; divided leaves with 1–3 (4) lobes on each margin and often trifid; lobes subtriangular to somewhat narrowly triangular or oblong to linear, 1.2–15 mm long, 0.2–1







mm wide, apically blunt to acutely but softly mucronate; all leaves green and with a sparse to occasionally dense vestiture of shortly stalked glandular hairs as on branches. *Peduncles* frequently and manifestly greatly exceeding the uppermost leaves. *Involute* c. 3–4 mm diam. *Bracts* 8–13, in c. 1 row, of similar or slightly variable length, obovate, 1.8–3.1 mm long, 0.6–1.6 mm wide, apices obtuse to acute, mainly herbaceous but with narrow hyaline margins, with a sparse to moderately dense scattering of shortly stalked glandular hairs c. 0.03–0.05 mm long on the surface and margins; not reflexing at maturity. *Receptacle* somewhat conical, areolate, glabrous. *Ray florets* probably outnumbering disc florets, corolla c. 3–4.5 mm long, c. 0.4–0.6 mm wide, only 3 veins observed, variously described as pale blue, pale mauve, lavender, lilac and white. *Disc florets* with corolla tube 1.4–1.8 mm long, yellow, 5-lobed. *Stamens* 5; anthers c. 0.75 mm long, lacking apical appendages, filament collar c. 0.15 mm long. *Style arms* c. 0.65 mm long, appendages narrowly triangular and manifestly longer than the stigmatic part. *Cypselas* monomorphic, flattened, obovate, 1.15–1.3 mm long, 0.5–0.7 mm wide, unwinged and lacking longitudinal ridges, mostly pale brown or somewhat yellowish brown but the moderately prominent ad/abaxial margins and carpopodium often slightly paler; cypselas body lacking tubercles but beset with long, biseriate, apically-curved eglandular, mostly pale whitish hairs c. 0.04–0.12 mm long and usually at least some sessile (or almost so) spherical glandular hairs c. 0.02–0.035 mm long; ab/adaxial margins smooth, glabrous or with scattered eglandular hairs as on body; pericarp with 2 vascular bundles; carpopodium present. *Pappus* a mostly barely developed jagged, uneven, whitish crown c. 0.02–0.09 mm long. *Chromosome number*:  $n = 271$  or  $1111 + 0-911 + 1s$ . **Fig. 1J, 21.**

*Distribution.* Queensland (Darling Downs, Leichhardt, Maranoa and Warrego) and northern New South Wales.

*Habitat.* A species commonly recorded from open grassland, herbfield and Brigalow country and mostly associated with clay or clay-loam soils.

*Phenology and reproductive biology.* Flowering and/or fruiting specimens have been collected in all months.

Pollen:ovule ratios have not been determined for this species but examination of pollen (from *R. Jones 120*) stained in aniline blue indicated the presence of large and small grains and presumably a high percentage of pollen sterility, an observation consistent with chromosomal observations.

The number of ray and disc florets in a capitulum was only determined for two capitula, one from the holotype specimen (*R. Jones 120*) having 71 female and 59 bisexual florets, another (*J.H. Ross 3651*) 67 female and 42 bisexual florets.

*Cytology.* A chromosome number of  $n = 271$  or  $1111 + 0-911 + 1s$  was recorded for this species by Watanabe et

al. (1996b, as *B. sp. aff. trachycarpa*, from near Dalby, Qld).

*Etymology.* The name is from one of the localities for the species, the town of Dalby.

*Notes.* Perhaps most closely related to *B. trachycarpa*, to which it has been previously referred to, but easily differentiated from that species by its non-tuberculate cypselas with manifestly apically inrolled eglandular hairs and a scattering of glandular hairs, and in specimens having at least some 3–8-lobed leaves; leaves are mostly entire in *B. trachycarpa*. However, it may be more closely related to *B. ciliaris* var. *subintegrifolia* which occurs just to the south of the distribution of this species. Although that species has both winged and unwinged fruit the unwinged fruit of the ray florets are very similar to those of *B. dalbyensis* in having long, apically-curved, eglandular hairs on their lateral surfaces; the fruit are, however, somewhat tuberculate.

A specimen *M.D. Crisp 3031* is atypical in that it has a well-developed indumentum of stalked glandular hairs over most of the plant; it otherwise seems to belong to this species but the ridge-top location (Peawaddy Gorge Lookout) where it was frequent on red clay loam over basalt is also unusual.

The specimen MEL 692624 is of this species but it has two different labels, one with “Brachycome (sp. perennis) Liverpool Plains”, the other “Head of the Gwydir”; the former is perhaps attributable to Allan Cunningham, the latter to Ludwig Leichhardt.

#### *Selected specimens examined.*

QUEENSLAND: Tara showground, 30 July 1959, *S.L. Everist 6077* (BRI); Moonie Hwy, 21 Sept. 1966, *W.T. Jones 3245* (CANB); between Oakey and Dalby, Dec. 1971, *V.K. Moriarty 857* (BRI, CANB *n.v.*); 2 km W of Oakey, 22 Nov. 1995, *J.H. Ross 3651* (MEL); Southwood N.P., 28 Aug. 1993, *E. Salkin 30* (MEL).

NEW SOUTH WALES: Croppa Creek, 9 Aug. 1983, *R. Medd 161127* (NSW); Boggabilla, Jan. 1935, *C.W. Winders* (BRI 331271).

#### **19. *Brachycome glandulosa* (Steetz) Benth.**

Fl. Austral. 3: 520 (5 Jan. 1867) (“*Brachycome*”); G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 230, Fig. 111 & 121, pl. vi, map 32 (1948) (“*Brachycome*”); Grieve & Blackall, How Know W. Austral. Wildfl. 804 (1975) (“*Brachycome*”); N.S.Lander in Marchant et al., Fl. Perth Region 663 (1987) (“*Brachycome*”), p.p., including *B. perpusilla*; E.Salkin et al., Austral. Brachyscemes 118 (1995). — *Bellis glandulosa* (Steetz) Klatt, Leopoldina 19: 32 (1883) (“*Brachyscome glandulosa* Benth.”). — *Silphiosperma glandulosum* Steetz in Lehm., Pl. Preiss. 1: 433 (Aug. 1845). — **Type citation:** “In Australasia occidentali. Herb. Preiss. No. 103.” **Lectotype:** Swan River Colony, *Preiss 103* (MEL 239751 p.p., ex herb. Steetz). (Davis 1948, p. 230, Fig. 111). **Isolectotypes:** LD 1039780 (per JSTOR), MEL 239751 p.p. (ex herb. Steetz), S 507-7487 (per JSTOR).

Annual herb, to c. 25 cm high, major branches ascending to erect, glabrous or with stalked glandular

hairs, the hairs at least biseriate for part of their length and septate. *Leaves* often subamplexicaul, c. 5–40 mm long, entire and linear or almost so or pinnatisect, if pinnatisect the largest leaves with c. 3–5 linear or sub-linear lobes to c. 8.5 mm long (the largest lobes usually entire, only rarely with secondary lobing as in *Fitzgerald* PERTH 413054) but leaves commonly with c. 2–9 teeth or lobes on each side of the leaf, the teeth with long-acuminate apices, glabrous or with stalked glandular hairs. *Involucre* 4.5–7.5 mm diam. *Bracts* 7–18, elliptic, ovate, oblanceolate to obovate or subrhombic, 2.65–3.7 mm long, 0.9–1.3 mm wide, upper margins slightly serrated and purplish, glabrous or with stalked glandular hairs. *Receptacle* glabrous. *Ray florets* c. 8–10; corolla c. 2–2.5 mm long, barely exceeding the bracts, with 2–4 veins, not or minutely 2- or 3-lobed, white. *Disc florets* c. 8 (recorded in a single small capitulum); corolla possibly only 5-lobed, yellow or greenish yellow. *Stamens* 5; microsporangia c. 0.5–0.7 mm long, apical appendages absent; filament collar straight in outline, c. 0.27 mm long. *Style* c. 1.4–1.6 mm long; style arms c. 0.6 mm long, with sterile triangular appendages exceeding stigmatic portion. *Cypselas* monomorphic, thin, flat, obovate, 2.8–3.4 mm long, 1.7–2.4 mm wide, apically distinctly notched, generally pale brown and similarly coloured throughout or somewhat discoloured, the wings paler than the rest; lateral surfaces smooth or very minutely papillate, usually with scattered, apically-curved, biseriate, eglandular whitish hairs; wing-like margins not inflated, entire, glabrous; carpopodium distinct, annular. *Pappus* absent. *Chromosome number*:  $n = 18$ . **Fig. 1L.**

*Distribution.* South-western Western Australia.

*Habitat.* Habitat notes are generally lacking but it is often found growing with mosses and other small herbs in sandy soil in granitic hollows. For *Newbey* 5825 it was recorded as growing “in patches in *Eucalyptus conglobata* open shrub mallee” in sandy loam.

*Phenology and reproductive biology.* A pollen:ovule ratio of 226 was determined for a small capitulum from *R. Ornduff* 9299–9A; it contained 7 female and 8 bisexual florets. No evidence of pollen abnormalities was observed.

Specimen labels indicate that flowering occurs in August and September with mature fruit formed from about mid-September to October.

*Cytology.* A chromosome number of  $2n = 36$  has been reported by Watanabe et al. (1996b).

*Notes.* The type specimen and many other specimens here referred to *B. glandulosa* have a prominent indumentum of stalked glandular hairs on the stems, leaves and bracts. There are also many specimens which are glabrous, but, by virtue of their otherwise identical morphology, are also referred here to *B. glandulosa*; both forms may be found growing together. I here take the view that the presence or absence of glandular hairs

is probably under simple genetical control and do not formally recognise the two variants.

This taxon and *B. perpusilla* are vegetatively similar, if not identical, and share another feature in that plants are usually glabrous or have a conspicuous indumentum of stalked glandular hairs. They also have similar cypselas, differing only in whether their cypselas have entire, glabrous ab/adaxial margins or have lobed margins, with each lobe terminating in an eglandular, apically-curved hair. The variation is such that four entities are recognisable: cypselas margins divided, plants glabrous; cypselas margins divided, plants glandular-hairy; cypselas margins entire, plants glabrous; and cypselas margins entire, plants glandular hairy. All four entities occur in south-western Australia and there are populations in which two or more entities occur intermixed, with all four growing together near Gnowangerup (see *P.G. Wilson* 4162a and 4162b, PERTH). On viewing W.V. Fitzgerald's mixed collection from Boulder (NSW 230286) Davis (1948) noted that the glandular-hairy plants with shallowly dissected fruit suggested hybridization between *B. glandulosa* (glandular hairy plants, fruit with entire margins) and a single specimen she referred to *B. perpusilla* var. *tenella* (glabrous plants with dissected fruit margins). In contrast, Lander (1987) expanded the circumscription of *B. glandulosa* to include the glandular-hairy specimens with fruit with dissected margins. Here, I speculate that the presence or absence of glandular hairs may be under simple genetical control and recognise two taxa on the basis of differences in cypselas morphology, *B. glandulosa* (margins of fruit entire and lacking hairs, plants glabrous or hairy) and *B. perpusilla* (margins of fruit divided and with eglandular hairs, plants glabrous or with stalked glandular hairs).

The morphological similarity of the two recognised taxa also led me to consider whether they would be better treated as one species, perhaps even recognising the glabrous and glandular-hairy variants. The fruit differences may not be under major genetical control, with variants maintained because of apparent limited outcrossing and high levels of selfing, as indicated by pollen:ovule ratios. However, the limited evidence also indicates that there is a ploidy difference preventing crossing between the two taxa. The only chromosome record for *B. glandulosa* indicates that it is a tetraploid ( $2n = 36$ ), while *B. perpusilla* is a diploid, and I have therefore opted to maintain them as distinct species.

#### *Additional specimens examined.*

WESTERN AUSTRALIA: North of Stirling Range, *Anon.* (MEL 692637); 20 miles SW Kojonup, Bridgetown Rd, 12 Sept. 1947, *N.T. Burbidge* 2536 (CANB, PERTH); W.A., *J. Drummond* 378 (MEL, W 145766, W); Midland Junction, Sept. 1900, *W.V. Fitzgerald* (PERTH); Boyagin Rock, SW of Brookton, on granite slope, 4 Sept. 1971, *A.S. George* 10902 (PERTH); 2 km S of Dryandra Village, Dryandra Forest, 30 Aug. 1983, *G.J. Keighery* 6743, (PERTH); Wooroloo, Aug. 1907, *Koch* 1654 (MEL, PERTH); Stirling Range, 18 Oct. 1902, *A. Morrison* (PERTH); N of Stirling Range, Oct. 1867,

*F. Mueller* (MEL 692636, MEL 692637); Stirling Range, Oct. 1867, *F. Mueller* (MEL 1562647, MEL 1562648); Cowalellup Reserve, 16 km SSE of Ongerup, 4 Sept. 1979, *K. Newbey* 5825 (PERTH); Boyagin Rock, 12 Sept. 1983, *R. Ornduff* 9299-9A (PERTH).

## 20. *Brachyscome parvula* Hook.f.

Fl. Tasman. 1: 185 (1856) ("*Brachycome*"; including references to informal varieties  $\alpha$  and  $\beta$ ); Benth., Fl. Austral. 3: 514 (1867) ("*Brachycome*"); P.S.Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 854, Fig. 172f (1999). — *Brachyscome parvula* var. *parvula*: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 212, Fig. 87, 99, pl. vi, map 26 (1948) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1456 (1986) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 174 (1995). — **Type citation**: "Gunn, 1971." **Holotype**: Flinders Island, 23 Oct. [sic.] 1844, *J. Milligan* (K 000882340, numbered as *Gunn* 1971 and label in Gunn's hand). **Isotypes**: Flinders Island, Killiecrankie Boat Harbour, 23 Oct. [sic.] 1844, *J. Milligan* 572 (NSW 15510, also numbered *Gunn* 1971 and label in Gunn's hand); Killiecrankie Boat Harbour, N.E. Flinders Isl., 23 Nov. 1844, *J. Milligan* 572 (MEL 601524). See notes below concerning variation in labels.

*Paquarina graminea* var. *heterophylla* Sond., Linnaea 25: 478 (Apr. 1853) ("*Pacquerina*"). — **Type citation**: "In Lofty-range et ad Gnichenbay [= Guichen Bay]." **New lectotype (here designated)**: Lofty ranges! in vallibus, *Mueller* (MEL 1562582), see note below.

*Brachyscome lissocarpa* J.M.Black, Trans & Proc. Roy. Soc. South Australia 52: 227 (1928) ("*Brachycome*"); J.M.Black, Fl. S. Austral. 1st ed. 585 (1929) ("*Brachycome*"). — *Brachyscome parvula* var. *lissocarpa* (J.M.Black) G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 213, Fig. 88, pl. vi, map 26 (1948) ("*Brachycome*"); E.L.Robertson, J.M.Black's Fl. S. Austral., 853 (1965, rev. edn) ("*Brachycome*"); J.H.Willis, Handb. Pl. Victoria 2: 668, 670 (1973) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1456, Fig. 656G (1986) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 178 (1995). — **Type citation**: "From Encounter Bay northward through the Mount Lofty and Barossa Ranges; South-East. - Victoria (Warmambool)." **Lectotype**: Yallum, south-east S.A. (MEL 220646). (Davis 1948, p. 213, Fig. 88); see notes below. **Isotypes**: AD 98420168 p.p., ex herb. J.M. Black; AD 97631361 p.p., ex herb. Tate. **Remaining syntypes and isotypes**: Golden Grove, 30 Sept. 1881, *Anon.* (AD 97631361 p.p., ex herb. Tate; K); Blumberg, 26 Oct. 1881, "a Tate dupl.", *Anon.* (AD 98420168 p.p., ex herb. Black; AD 97631361, ex herb. Tate); Tintara, Oct. 1881, *Anon.* (AD 97631361 p.p., ex herb. Tate); Golden Grove or Blumberg, 1881, *Anon.* (AD 98419305 p.p., ex herb. Black); Tintara, 1881, "Tate herb.", *Anon.* (AD 98419305 p.p., ex herb. Black); Mt Graham, 20 Nov. 1882 [?], *Anon.* (AD 97631361 p.p., ex herb. Tate); head of Scott's Creek, 9 Nov. 1885, *Anon.* (AD 98420168 p.p., ex herb. Black); wildflower show, 13 Oct. 1925, *Anon.* (AD 98419304 p.p., ex herb. Black); Myponga, Nov. 1909, *Anon.* (AD 98419305 p.p., ex herb. Black, fragmentary); Inman Valley near Encounter Bay, 15 Sept. 1925, *J.B. Cleland* (AD 98419306 p.p., ex herb. Black); Myponga, 13 Oct. 1926, *J.B. Cleland* (AD 98419305 p.p., ex herb. Black; BRI 330621; NSW 15512, ex herb. Black); Victor Harbour, Oct. 1911, "per Mr Gray" [?], (AD 98419305 p.p., ex herb. Black); Port Elliot, *Hussey*

3 (AD 97631361 p.p., ex herb. Tate); Coromandel Valley, 1894, *J.G.O. Tepper* (AD 98419306 p.p., ex herb. Black); Warmambool, December 1901, *H.B. Williamson* (AD 98419304 p.p., ex herb. Black, fragmentary; NSW 15508, NSW 15509).

Perennial, perhaps sometimes annual, *herb* to 45 cm tall, branches ascending to erect, glabrous or with minutely stalked-glandular hairs on capitulum-bearing branches. *Leaves* basal and cauline, entire throughout or a mixture of entire leaves and variously divided leaves, all leaves glabrous and sometimes slightly succulent; entire leaves narrowly elliptic, oblanceolate, linear-oblanceolate or linear, 5–90 mm long, 1–9 mm wide; divided leaves with 2–6 shallow to deep lobes which are somewhat triangular or narrowly triangular or sublinear to linear, the linear lobes 5–16 mm long. *Involucre* 3–5 mm diam. *Bracts* 15–20, in c. 1 row and of equal length, elliptic or obovate, 2.5–4.7 mm long, 0.6–1.7 mm wide, with scarios, often purplish margins, with few (to many) stalked glandular hairs on surface and margins. *Receptacle* subconical, areolate, glabrous. *Ray florets* c. 40–80; corolla c. 5–8 mm long, white or mauve, 2- or 3-veined, apex minutely 2-lobed. *Disc florets* c. 44–74; corolla 5-lobed and the inner surface of the apices with short protuberances, tube yellow, 1.8–2.5 mm long. *Stamens* 5; microsporangia 0.94–1.3 mm long; apical appendages absent. *Style* arms 0.82–1.3 mm long, appendages 0.52–0.75 mm long, triangular to narrowly triangular and longer than the stigmatic part. *Cypselas* laterally flattened, obovate, 1.4–2.1 mm long, 0.6–0.8 mm wide, unwinged but with broad ad/abaxial margins, manifestly discolorous with margins yellowish or yellow-brown and body brown-black; cypselas bodies may be minutely papillate but otherwise smooth except for some short, biseriate, apically-curved eglandular hairs; ab/adaxial margins may be minutely papillate but otherwise smooth, glabrous; pericarp with 2 vascular bundles; testa cells thin-walled (*Willis*, MEL 1513670); carpodium present, annular. *Pappus* a minute, barely formed crown less than 0.1 mm tall or absent. *Chromosome number*:  $n = c. 30–50$ . **Fig. 1K.**

**Distribution.** Extending south-east from the Mt Lofty Ranges in South Australia to southern Victoria and the north-east coast of Tasmania, including islands of Bass Strait.

**Habitat.** Habitats range from coastal cliffs and saline, marshy ground near the sea, to inland *Themeda* grassland and *Eucalyptus* woodland and forest.

**Phenology and reproductive biology.** Flowering is usually recorded from September to April.

A pollen:ovule ratio of 2,513, determined for a capitulum of *A. Moscal* 3181 from northern Tasmania, suggests cross-pollination is common. However, observations of pollen sterility also suggests apomixis in some populations. Although *A. Moscal* 3181, and some specimens from the Southern Lofty (*R. Bates* 29986) and South-eastern regions (*P.E. Conrick* 1268, *D. Hunt*

2159) of South Australia and western Victoria (*A.C. Beaglehole* 86199) displayed fully-fertile pollen or less than 1% sterility, others from both South Australia (*A.A. Munir* 5404) and Victoria (*W.R. Barker* 1402, *I.C. Clarke* 2206) exhibited c. 21–70% sterility.

*Cytology.* Stace recorded  $n = c. 30-50$  on the specimens *H.M. Stace* 5824 and *H.M. Stace* 5824A housed in SYD. The individuals are from a population on Greens Creek Road, near the Victoria Valley Road turnoff in the Grampians region of Victoria

A chromosome determination of  $n = 9$  recorded by Smith-White et al. (1970) and Carter (1978a) from Curtin Springs does not apply to this species but to *B. gilesii*

*Notes.* Black, when describing *B. lissocarpa* was apparently unaware of *B. parvula* – it having been described from Tasmania – and considered *B. lissocarpa* to be “near *B. heterophylla*”, a species with quite different fruit morphology and having anthers with apical appendages. Davis found the fruit of specimens referred to *B. lissocarpa* to be “identical in every way with those of *B. parvula*” (Davis 1948, p. 215), and thus, in keeping with her hypothesis that variation in fruits is a specific character, relegated the name to synonymy. However, because of leaf variation, she recognised the taxon as a distinct variety, var. *lissocarpa*, noting that the geographical distribution of var. *parvula* and var. *lissocarpa* “is interesting in that one can be said to begin where the other leaves off, there being slight overlap in western Victoria” (Davis 1948, p. 215). Willis (1973) followed Davis in reducing *B. lissocarpa* to varietal status although more recently, but without explanation, I (Short 1999, p. 854) indicated that “retention of the name var. *lissocarpa* for specimens with highly dissected leaves seems untenable.” I still believe this, but not because I am sure that only one species is encompassed under this name, but because I am unsure as to how many entities there are and how to circumscribe them. There is considerable variation in not just leaf shape but also in the presence or absence of an indumentum of stalked glandular hairs on the involucre bracts and upper branches, and seemingly in capitulum size (e.g. compare *R. Bates* 21002 with *M.G. Corrick* 7545). Also, as noted above, examination of percentage pollen sterility suggests apomixis in some populations and the unpublished observations by Stace suggest different levels of ploidy exist. More studies, including chromosome number surveys, the employment of numerical techniques and molecular work, will presumably result in a better understanding of the patterns of variation displayed by this broadly-circumscribed taxon.

Note, that if it is desired that specimens with divided leaves and mostly linear segments be recognised as a distinct variety, the name var. *heterophylla* has priority over var. *lissocarpa*. In keeping with my above comments, I have not made the combination.

*Typification* of *B. parvula*. Hooker (1856), immediately after his description of *B. parvula*, cited a single collection, *Gunn* 1971. He then proceeded to describe var.  $\alpha$ , for which no specimen was cited. Following this was a brief description of var.  $\beta$ . This was followed, on a separate line and therefore possibly pertaining to the species as a whole, “HAB. Flinders’ Island, *Milligan*. - (Fl. Oct.)”. Hooker further stated that this was a “very small species, of which I have but few specimens” and that “Variety  $\alpha$  has very short stems or none, with radical leaves about  $\frac{1}{2}$  inch long, and solitary scapes with no bracts or one or two very small ones. Variety  $\beta$  has four or five scapes or stems from the roots ...”.

At K there is a single sheet containing *R.C. Gunn* 1971. The material on the left-hand side of the sheet (K 000882340) is accompanied by two labels, one with “Brachycome n. sp. Flinders Island 1971 23/10/44” and the other “1971 Brachycome n. sp. Purple flowering. - from Flinders Island where it was collected by Jos. Milligan.” These labels explain the references to both Gunn and Milligan in the protologue. Indeed, as outlined by Buchanan (1988, 1990) the application by Gunn of his own numbers to specimens originally collected by Milligan is not unusual. The collection to which the labels refer consists of three plants, thus conforming with Hooker’s note that he had “but few specimens”. Furthermore, although the two upper ones are not designated as such by Hooker, they are clearly referable to his var.  $\alpha$ , and with its decumbent “scapes or stems from the root” the lower plant conforms with his description of var.  $\beta$ . These facts all indicate that it is the collection upon which Hooker based his description and that K 000882340 should be considered to be the holotype specimen of *B. parvula*.

The method of description employed with informal varietal names by Hooker in *Fl. Tasman.* is such that specimens he indicated to belong to var.  $\alpha$ , as opposed to other informal varietal designations such as var.  $\beta$ , are generally considered to be the “typical” form of the species. Thus, in this case, were the varieties  $\alpha$  &  $\beta$  referring to two distinct varieties worthy of formal names the name *B. parvula* var. *parvula* would be considered to refer to var.  $\alpha$ . However, in this case both informal designations refer not only to the one taxon but to specimens which I believe are part of the one gathering, *J. Milligan* 572. The diminutive plants are just that, small and unbranching compared to the larger, branching plant. Such a range is not uncommon in the one population, e.g. as in *A. Moscal* 3209 and *A. Moscal* 4327. Accordingly, the holotype of the name *B. parvula* is considered to consist of all plants of *J. Milligan* 572.

As with the holotype, the isotype specimen in NSW bears a label in Gunn’s hand, has Gunn’s species number “1971”, records the same date of collection “23/10/44”, and gives the locality as Flinders Island, differing only in the addition of “Killiecrankie Boat Harbour” to the locality details and recording “JM 572”, the latter being Milligan’s collection number.

The additional isotype in MEL bears two labels, one or both of which are seemingly in Milligan's hand. Both bear Milligan's collection number "572", both give the locality as "Killiecrankie Boat Harbour" and both record the date of collection as "23/11/44", not "23/10/44". That the former is the correct date of collection and that Gunn made a mistake when transcribing labels seems indisputable. Not only does the MEL isotype contain original labelling but the list of Milligan's collection localities published by Buchanan (1988) show Milligan to have been collecting on Vansittart Island at the southern end of Flinders Island on the 23<sup>rd</sup> of October, not at Killiecrankie Bay which is on the northern coast of the island.

The sheet at K containing the holotype specimen (K 000882340) also has four plants on the upper, right-hand side of the sheet (K 000882339) which have at some time been clearly separated, by ruled lines, from the aforementioned specimens. They too are part of the Hooker herbarium and the accompanying label has "Brachycome parvula. Flinders Island. Milligan. Herb. F.Muell.", indicating that they were sent from MEL to K as a separate collection. Although collected by Milligan they are neither dated or numbered and, with three of the plants being erect specimens, they do not conform with the protologue. They are here assumed to be duplicates of other Milligan collections of this taxon from Flinders Island, i.e. *J. Milligan 1199* (MEL 601522, MEL 601523) and *J. Milligan 1028* (MEL 601525), all collected on 2 Nov. 1845.

*Typification of P. graminea* var. *heterophylla*. From the locality data cited in the original protologue it is evident that the lectotype specimen chosen by Davis (1948, p. 171; MEL 1562575) for the name *Paquerina graminea* var. *heterophylla* was inappropriate, it having been collected by Mueller from Mt Sturgeon in western Victoria, not from the Mt Lofty Ranges or the Guichen Bay region in South Australia. The locality data of the new lectotype specimen is in accord with the protologue.

Davis (1948, p. 171) stated that

The three varieties of *Paquerina* [*graminea*] described by Sonder (Linnaea, xxv (1852) [sic., 1853], 478) have never been adopted in general terminology and were not legitimately transferred to *Brachycome* by Mueller ... Type selection has been made in each case ... but the varieties as such are abandoned."

It transpires that on pp. 212 & 213 of the same publication she made reference to both *B. graminea* var. *angustissima* and *B. graminea* var. *heterophylla*, attributing on p. 212 the authorship to Sonder. This was clearly a minor error on her part, with "B." (for *Brachyscome*) replacing the intended "P." (for *Paquerina*).

*Typification of B. lissocarpa*. Davis (1948), when choosing a lectotype for the name *B. lissocarpa*, nominated a specimen in MEL, and not – as would be normal practice – one from J.M. Black's herbarium which is now held in AD. None the less, the label accompanying the specimen may well be in Black's

hand and most certainly the method of labelling in which the information is written directly on to the sheet is consistent with Black's methodology. Thus, I believe the specimen must be considered to have been part of the syntype series examined by Black.

The label accompanying the lectotype specimen reads "Brachycome / lissocarpa / J.M.Black / Yallum, / South-East / "Flowers lilac"." There are two specimens in AD which I regard as isolectotypes. One of these (AD 98420168 p.p.) has a label stating "Brachycome lissocarpa / Yallum, S.E. / "Oct"; flr lilac." / Tate duplicate" and is part of Black's herbarium; the other (AD 97631361 p.p.) has a label reading "76 / Yallum / October / flower lilac" and is from the Tate herbarium. The number on the latter specimen suggests that it may well be the original collector's label, with the duplicates removed and subsequently re-annotated with abridged details. As well as having the same locality, the belief that all three specimens (the lectotype and the two isolectotypes) form part of a single gathering is reinforced by the fact that all three are labelled as having lilac flowers. No other specimens of this species in Black's herbarium are labelled with this information, rays being recorded as either white or violet. At one stage another sheet (AD 98419304) from Black's herbarium may have contained an isolectotype, there being a label with the annotation "Brachycome / Yallum S.E. / "Oct"; flr lilac." / (Tate duplicate)" but no attached specimen. There is an illustration of a fruit next to the label, suggesting that some were once stuck to it but have since fallen off. The label also has the additional annotation "sent Cheel 10/4/28". Edwin Cheel was at NSW but I have not seen an isolectotype specimen from there. Note that Davis regarded J.M. Black to be the collector of the lectotype specimen but it is clear from the above annotations that this is erroneous as it was originally part of Professor Ralph Tate's herbarium.

In citing syntypes and isosyntypes of the name *B. lissocarpa* I am assuming that Black saw all specimens in the Tate herbarium which are mounted on AD 97631361.

#### *Selected specimens examined.*

SOUTH AUSTRALIA: East of Mt Scott C.P., 7 Oct. 1989, *R. Bates 21002* (AD); Mt Crawford, 26 Nov. 1989, *R. Bates 21663* (AD); Fairview C.P., 4 Oct. 1982, *P.E. Conrick 1268* (AD); Bool Lagoon–Lucindale road, 17 Sept. 1961, *D. Hunt 73* (AD); Julia Hill, Penola Forest, 4 Oct. 1964, *D. Hunt 2159* (AD).

VICTORIA: Tea Tree Creek, S of Glenisla Station, 19 Jan. 1968, *A.C. Beaglehole 24819* (AD, MEL); The Grotto area, Port Campbell N.P., 30 Oct. 1966, *A.C. Beaglehole 86199* (MEL); Cape Nelson, 2 Dec. 1992, *I.C. Clarke 2206* (MEL); 2 km SSE of Mt Bolangum, 2 Nov. 1981, *M.G. Corrick 7545* (MEL); Dawson Station Reserve, 30 Nov. 1981, *N.H. Scarlett 81-253* (MEL); Bullies' Ridge, lower Glenelg River, 30 Oct. 1948, *J.H. Willis* (MEL 2035484).

TASMANIA: Croppies Point, 22 Mar. 1982, *A.M. Buchanan 1653* (HO); near Lady Barron, Flinders Is., 9 Dec. 1975, *W.M. Curtis* (HO 10043); Flinders Is., beside the Whitemark–Emita road, 8 Nov. 1966, *J.S. Whinray 22* (HO).

**21. *Brachyscome perpusilla* (Steetz) J.M.Black**

Fl. S. Austral. 587, Fig. 245 N (1929) ("*Brachycome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 230, Fig. 112 & 122, pl. vi, map 32 (1948) ("*Brachycome*"), incl. var. *perpusilla* and var. *tenella*; E.L.Robertson, J.M.Black's Fl. S. Austral., 856, Fig. 1152Y (1965, rev. edn) ("*Brachycome*"), includes var. *tenella* following Davis (1948); J.H.Willis, Handb. Pl. Victoria 2: 672 (1973) ("*Brachycome*"), including var. *tenella*; Grieve & Blackall, How Know W. Austral. Wildfl. 805 (1975) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1456, Fig. 657A (1986) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 180 (1995); P.S. Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 854, Fig. 173a (1999). — *Silphiosperma perpusillum* Steetz in Lehm., Pl. Preiss. 1: 434 (1845). — *Brachyscome collina* var. *perpusilla* (Steetz) Benth., Fl. Austral. 3: 521 (1867) ("*Brachycome*"). — **Type citation**: "In Australasia occidentali. Herb. Preiss. No. 2416." **Lectotype**: Swan River Colony, Preiss 2416 (MEL 1562643 p.p., ex herb. Steetz). (Davis 1948, p. 231, Fig. 112). **Isolotypes**: G 00222782 (per JSTOR), LD 1084292 (per JSTOR), MEL 1562643 p.p. (ex herb. Steetz).

*Brachyscome tenella* Turcz., Bull. Soc. Imp. Naturalistes Moscou 24(1): 176 (March 1851) ("*Brachycome*"). — *Brachyscome perpusilla* var. *tenella* (Turcz.) G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 231, Fig. 113, pl. vi, map 32 (1948) ("*Brachycome*"); G.M. Cunningham et al., Pl. W. New South Wales 653, Fig. 64x (1981) ("*Brachycome*"); J.Everett in G.J.Harden, Fl. New South Wales 3: 165 (1992) ("*Brachycome*"). — **Type citation**: "Nova Hollandia. Drum. IV. n. 208." **Holotype**: KW 001001455 (per JSTOR, Sept. 2012). **Isotypes**: G 00222781 (per JSTOR), K 000882314 & 000882316, TCD, W.

*Silphiosperma collinum* Sond., Linnaea 25: 483 (Apr. 1853). — *Brachyscome collina* (Sond.) Benth., Fl. Austral. 3: 521 (1867) ("*Brachycome*"). — *Ctenosperma collina* F.Muell. in sched., Linnaea 25: 483 (Apr. 1853), nom. illeg. — **Type citation**: "Ad fodinas Burra Burra. Septemb. Holdfastbay. August. In planitie graminosa inter Adelaide et Gawlertown. Sept." **Lectotype**: Adelaide, F. Mueller (MEL 1562655 p.p.). (Davis 1948, p. 231). **Isolotypes**: MEL 1562655 p.p.. **Remaining isosyntype**: Holdfast Bay, Aug. 1851, F. Mueller (MEL 1562656), see below.

Annual herb, 3–23 cm high, major branches ascending to erect, glabrous or with stalked glandular hairs. Leaves often subamplexicaul, 5–25 mm long, entire and linear or pinnatisect and often with three or more lobes in the upper half and 2–6 short, narrow lobes or teeth on each side of the lower half of the leaf, glabrous or with stalked glandular hairs. Involucre 1.8–3.9 mm diam. Bracts 5–14, widely elliptic to elliptic, widely obovate to obovate or widely ovate to ovate, 2–3.4 mm long, 1–2.4 mm wide, glabrous or with stalked glandular hairs. Receptacle convex, glabrous. Ray florets 4–17; corolla 0.7–1.3 mm long, with 3 or 4 veins, 2- or 3-lobed, white or pale greenish-white. Disc florets 5–17; corolla 0.5–0.9 mm long, 4 (5)-lobed, yellow or greenish-yellow. Stamens 4 (5); microsporangia 0.21–0.38 mm long, apical appendages absent or poorly developed and less than 0.05 mm long.

Style with sterile appendages triangular and longer than the stigmatic portion. Cypselas monomorphic, thin, flat, obovate, 2.1–2.8 mm long, 1.3–1.7 mm wide (excluding divided part of wing-like margins), uniformly brown or yellowish brown or somewhat discolorous; lateral surfaces smooth or very minutely papillate, with scattered, apically-curved biseriate, eglandular hairs; wing-like margins not inflated, divided throughout their length into 8–17 narrow lobes, the lobes 0.05–0.4 mm long, and each terminating in an apically-curved, biseriate, eglandular hair; pericarp with 2 vascular bundles situated towards the edge of the ab/adaxial margins, sclerenchyma throughout the wing-like margins but otherwise absent; testa cells with u-shaped thickening (P.S. Short 2790); carpodium distinct, annular. Pappus absent. Chromosome number:  $n = 9$ . **Fig. 1M, 9D, E.**

**Distribution.** Widespread, being found throughout much of southern mainland Australia (W.A., S.A., N.S.W., Vic.) and also in Tasmania. In Tasmania it is known to me from just three collections, two from the north-eastern mainland in the vicinity of Croppies Point, the other from Flinders Island.

There are records of the species as an alien in New Zealand, with Webb (1988, p. 183) referring to "collections made from erosion debris and depleted grassland, Wither Hills, Marlborough, in 1944."

**Habitat.** In keeping with its distribution the species is recorded from a diversity of habitats, e.g. in Victoria it is recorded from *Eucalyptus tetricornis* woodland at Briagolong in Gippsland and from a salt marsh with *Melaleuca halmaturorum* in the west of that State. It is common on loam or sandy loam throughout much of the mallee eucalypt communities of South Australia and Western Australia and is often found in moss swards on granite outcrops.

**Phenology and reproductive biology.** Flowers from about August to November.

No evidence of pollen abnormalities were noted during determination of pollen:ovule ratios. Estimated values ranging from 40 to 149 were determined from 30 capitula taken from two populations, i.e. P.S. Short 3715 (Corunna Hill, S.A.) and P.S. Short 3776 (Mt Arapiles, Vic.).

Carter (1978a) reported that although W.A. populations with  $2n = 18$  produced regular tetrads and pollen and appeared to be sexual diploids, pollen irregularities in a presumed tetraploid from Lake Hindmarsh, Victoria suggested it was apomictic. The voucher specimen at SYD (S. Smith-White & C. Carter 5320) annotated as *B. perpusilla* and from Lake Hindmarsh is not of this species but belongs to the apomictic *B. ciliaris* complex.

Salkin et al. (1995) recorded ready germination of seed after 7–20 days.

**Cytology.** Chromosome number determinations of  $n = 9$  and  $2n = 18$ , 36 have been reported for this species

(Smith-White et al. 1970; Carter 1978a; Watanabe & Short 1992; Watanabe et al. 1996b). Only  $n = 9$  has been reported for Western Australian populations, while both diploids and tetraploids have been recorded in the eastern States; the reports of tetraploids are, however, unsubstantiated or incorrect and on current evidence should be ignored. As noted above, Carter's record of  $2n = c. 36$  from Lake Hindmarsh is definitely an error, applying to an entity belonging to the *B. ciliaris* complex. This may also be the case for the Smith-White et al. (1970) record of  $2n = 36$  for a South Australian collection. There appears to be no voucher for this record in SYD, Carter's specimens of this species collected in South Australia in 1970 being after submission of the above paper. Furthermore, in his subsequent paper Carter (1978a) made no reference to this earlier determination, which also suggests the earlier report was subsequently considered to have been incorrect.

An idiogram of somatic metaphase chromosomes collected at Totadgin Rock, W.A. (Watanabe 115) was published by Watanabe et al. (1999, Fig. 38).

It may not be of significance but all determinations of  $n = 9$  are from glabrous forms (the typical form) of *B. perpusilla*.

**Typification.** In regard to the type of the name *Brachyscome tenella* Turcz., Davis (1948) could only trace a collection of *Drummond 208* to K and did not select a lectotype. Marchant (1990) recorded that a specimen is in KW and I have subsequently (September 2012) seen it on the JSTOR Plant Science web site and consider it to be the holotype specimen of *B. tenella*. An isotype at TCD consists of ten plants on the one sheet; there is no indication that it was seen by Turczaninow.

As the Sonder herbarium was purchased for MEL it is somewhat surprising that it holds no definite remaining syntype specimens of the name *Silphiosperma collinum* Sond. Mueller's specimen from Holdfast Bay is a logical candidate but in an annotation, dated 5 May 1944, curator J.H. Willis recorded "this collection was never seen by W. Sonder", hence its listing as a remaining isosyntype above. There is also a specimen, MEL 1562661, which may be of the one gathering; it consists of five plants, and has a label indicating that Mueller collected it from the vicinity of Gawler, South Australia on 14 September 1848. Given the protologue, it too is an obvious candidate for being original syntype material. However, the specimen has two other labels, one seemingly recording the locality as "Mt M'Ivor", while the other has "Foot of Mount Alexander"; both localities are in Victoria. In the absence of other specimens it can be argued that the Gawler label does apply to this specimen but, in an annotation dated 16 Aug. 1942, Jim Willis wrote of this label that it "very doubtfully belongs here" and, as he was presumably involved in the curation and mounting of what were then unmounted specimens, his opinion should be accepted.

**Notes.** In very small specimens all leaves may remain entire but teeth or lobes are usually developed in some leaves.

As in *B. glandulosa*, plants tend to be either glabrous or have a prominent indumentum of stalked glandular hairs, with the latter form most evident in specimens from W.A. Most collections from the eastern States tend to be glabrous although specimens with occasional, rarely many, stalked glandular hairs are also found. For example, several glandular hairs are evident on the bracts of the type specimen of *Silphiosperma collinum*. There are few herbarium collections where it is evident that glandular-hairy and glabrous plants grow together, although this is the case for *P.S. Short 3899* (MEL) and *P.S. Short 3900* (MEL, PERTH); all plants comprising these collections were growing together in a moss sward along the Dolphin Cove Track in Cape Arid National Park. Glandular-hairy plants were larger than glabrous plants and had erect rather than ascending stems although shading may well have affected habit. It is also evident that the lobes on the cypselas tend to be shorter in glandular-hairy plants, an observation suggesting that there may be some value in formally naming the glandular-hairy form but, as nothing is known of the genetical nature of the differences, I have refrained from doing so. As suggested under *B. glandulosa*, the presence or absence could perhaps be under simple genetical control.

As indicated under *B. glandulosa*, both it and *B. perpusilla* sometimes occur together and are undoubtedly closely related.

#### *Selected specimens examined.*

WESTERN AUSTRALIA: Ejah, Mileura Stn, 23 Aug. 1973, *N.T. Burbidge & A. Kanis 8160* (CANB, PERTH); Bellevue, Aug. 1901, *Diels & Pritzel 433* (PERTH); NE of New Norcia, 1 Oct. 1903, *A. Morrison 13053* (PERTH); Maya, 8 Sept. 1954, *R.D. Royce* (PERTH); Wongan Hills, 16 Sept. 1973, *P.G. Wilson 11603* (PERTH).

SOUTH AUSTRALIA: Gammon Ranges, 19 Sept. 1956, *H. Eichler 12779* (AD); Tarmma, Tothill Range, 5 Oct. 1968, *D.N. Kraehenbuehl 2297* (AD); Hillside, Eyre Pen., 26 July 1968, *A.E. Orchard 944* (AD).

NEW SOUTH WALES: "Buckambool", S of Cobar, 31 Aug. 1968, *E. D'Arny & K. Wells* (CANB); Mt Binya, Griffith, 18 Oct. 1978, *P.L. Milthorpe & G.M. Cunningham* (NSW 230293); Gulpa State Forest, 14 Oct. 1983, *D.E. Jones 1496* (NSW).

VICTORIA: Grampians, N end of Black Range, 8 Sept. 1969, *A.C. Beauglehole 30938* (MEL); Kulkynie Homestead, 23 Aug. 1988, *J.H. Browne 512* (MEL); 1 km SW of Chewton, 6 Oct. 1981, *T.B. Muir 6749* (MEL).

TASMANIA: Croppies Point, 23 Nov. 1983, *A. Moscal 4387* (HO); S of Mt Tanner, Flinders Is., 25 Sept. 1989, *P. Collier 4157* (HO); Waterhouse Res., nr One tree Hill, 21 Nov. 1983, *A.M. Buchanan* (HO 81670).

#### **22. *Brachyscome rigidula* (DC.) G.L.R.Davis**

Proc. Linn. Soc. New South Wales 73: 219, Fig. 93, 104, pl. vi, map 28, pl. xi, no. 1 (1948) ("*Brachyscome*"); W.M. Curtis, Stud. Fl. Tasman. 298 (1963) ("*Brachyscome*"); J.H. Willis, Handb. Pl. Victoria 2: 674 (1973)



("Brachyscome"); J. Everett in G.J. Harden, Fl. New South Wales 3: 165 (1992) ("Brachyscome"); E. Salkin et al., Austral. Brachyscomes 200 (1995); P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 855, Fig. 173b non 173c (1999). — *Steiroglossa rigidula* DC., Prodr. 6: 39 (1838). — **Type citation**: "in paludosis planitiebus Novae-Hollandiae ad meridiem lacis Georgii lat. 35° 4' aprili flor. legit cl. A. Cunningham ... (v.s. comm. à cl. inventore.)." **Lectotype**: Lake George, N.S.W., lat. 35° 4', Apr. 1824, A. Cunningham "8" (G-DC). (Davis 1948, p. 219, pl. xi no. 1). **Probable islectotypes**: Cunningham "25" (BRI [1?]4170, K 000882326, MEL 1562715), see below.

*Brachyscome squalida* Hook.f., Hooker's Lond. J. Bot. 6: 115 (1847) ("Brachyscome"). — **Type citation**: "Spring Hill; Gunn." **Holotype**: Spring Hills, 22 March 1842, R.C. Gunn 706/1842 (K 000882328). **Isotype**: Top of Spring Hills, 22 March 1842, R.C. Gunn 706/1842 (NSW).

*Brachyscome multicaulis* F.Muell., Defin. Austral. Pl. 10 (28 June–12 July 1855) ("Brachyscome"), preprint from Trans. Philos. Soc. Victoria 1: 43 (1855), reprinted in Hooker's J. Bot. & Kew Gard. Misc. 8: 148 (1856), for dates of publication see Seberg (1986). — **Type citation**: "On the highest cliffs of Mount Buller." **Lectotype**: Mt Buller, "on the rocky summit", 23 Mar. 1853, F. Mueller (MEL 1562712 p.p.). (Davis 1948, p. 220). **Isolectotypes**: Mt Buller, 1853, F. Mueller (K 000882330); Mt Buller, F. Mueller (K 000882331); Mt Buller, on the rocky summit, 23 Mar. 1853, F. Mueller (MEL 1562712 p.p.); On the highest rocky declivities of Mount Buller, Mar. 1853, F. Mueller (MEL 1562713); MEL 1562712 p.p., excl. lectotype; Mt Buller, 1853, F. Mueller (MEL 1562710, ex herb. Sond.); Mt Buller, F. Mueller (MEL 1562711, NSW 15541, TCD).

*Brachyscome ciliaris* var. *robusta* Benth., Fl. Austral. 3: 519 (1867) ("Brachyscome"). — **Type citation**: none; Benth. listed *B. squalida*, *B. strongylospermoides*, *B. multicaulis* and *Steiroglossa rigidula* in synonymy. **Lectotype** (Davis 1948, p. 220) and **islectotypes** as per *B. multicaulis*.

*Brachyscome multipartita* F.Muell., pro syn.: included as a synonym of *B. ciliaris* auct. non (Labill.) Less. (= *B. rigidula*) by Hook.f., Fl. Tasman. 1: 187 (1856) ("Brachyscome").

[*Brachyscome ciliaris* auct. non (Labill.) Less.: Hook.f., Fl. Tasman. 1: 187 (1856) ("Brachyscome").]

Perennial herb or subshrub, major branches prostrate to erect, c. 20–60 cm long, with a dense indumentum of shortly stalked glandular hairs. Leaves cauline, 10–25 mm long, 1- or 2-pinnatifid, glabrous or with scattered to many stalked glandular hairs; primary lobes narrowly elliptic or somewhat linear, 0.5–1.5 mm wide, mucronate. Involucre 6–13 mm diam. Bracts c. 11–20, of equal length, in 1 row, elliptic to narrowly elliptic or obovate to oblanceolate, 3.3–5.6 mm long, 0.8–1.7 mm wide, mostly herbaceous but with narrow scarious margins and apex, the apex obtuse, outer surface and edges with shortly stalked glandular hairs, bracts strongly 1-veined. Receptacle subconical. Ray florets c. 22–37; corolla 7–13 mm long, white, mauve, purple or pinkish. Disc florets 5-lobed, yellow. Stamens 5, lacking or with poorly developed sterile apical appendages. Style with the apical appendages narrowly triangular, c.



Fig. 23. *Brachyscome rigidula*, near Mt Jim, Vic. — P.S. Short 3106.

1.7–1.9 times the length of the stigmatic part. *Cypselas* essentially monomorphic or very rarely dimorphic, thin, flat, obovate, 2.3–3.5 mm long, 1.3–1.6 mm wide, apically notched, discolorous, with the fruit body brown and the vascular ribs and wings yellowish; lateral surfaces of fruit body smooth or shortly tuberculate, scattered glandular hairs present or absent; wing-like extensions 0.05–0.5 mm wide, somewhat swollen, entire to irregularly and often deeply dissected and with short, curved eglandular hairs along their length; pericarp with 2 vascular bundles; testa cells with evenly thickened walls (P.S. Short 3086, probably *B. multicaulis* s.str.); carpodium annular. Pappus a crown of white bristles 0.1–0.4 mm high. Chromosome number:  $n = 9$ . Fig. 2A, 23.

**Distribution.** Montane country of eastern New South Wales, southern Queensland, Australian Capital Territory, Victoria and Tasmania.

I (Short 1999) have previously doubted that the species occurs in the Grampians region in western Victoria but a specimen (*Anon.*, MEL 619420) from nearby Moyston has now been seen. In Victoria the species is otherwise restricted to the eastern highlands.

The only records for southern Queensland are from Stanthorpe, one an undated immature specimen attributed to F.M. Bailey (MEL 1562692), the other also undated and somewhat immature and collected by Rev. B. Scortechini (MEL 220561).

**Habitat.** Ranging from herbfield and shrubland of alpine areas (e.g. Mts Bogong, Hotham and Higginbotham in Victoria) to subalpine grassland (e.g. *Themeda* grassland above Lake Omeo, Victoria) and open eucalypt forest at lower altitudes.

**Phenology and reproductive biology.** Flowers from about August to May. Salkin et al. (1995) recorded that the plant can spread by layering and that in cultivation the brightly coloured forms do not retain their original colours.



**Cytology.** Chromosome number determinations of  $n = 9$  and  $2n = 18$  and  $2n = 18 + 0-2Bs$  have been reported for this species by Smith-White et al. (1970, no voucher seen), Watanabe & Short (1992) and Watanabe et al. (1996b, including specimen referred to *B. aff. multicaulis*). Determinations encompass the broad and narrow-leaved variants referred to below.

An idiogram of somatic metaphase chromosomes was published by Watanabe et al. (1999, Fig. 26).

**Typification of *B. multicaulis* and *B. ciliaris* var. *robusta*.** Davis (1948, p. 220 under "Specimens examined") recorded "Mt. Buller, 'on the rocky summit', 23.3.1853, F. Mueller (lectotype and lectoparatype of *B. multicaulis* and *B. ciliaris* var. *robusta*, MEL, NSW)". The lectotype specimen annotated by Davis is held at MEL. I have not seen a duplicate or likely duplicate in NSW but there are other specimens which I have listed above and which I believe, despite their lack of a date (or nothing more exacting than 1853), can be considered to be isolectotypes of the names. As mentioned elsewhere when discussing typification of other names for which Mueller was author, it is common to find minor variations – often nothing more than trifling omissions or generalisations of locality – between labels and the protologue. This is evident here, where two of the isolectotype specimens (MEL 1562711 & MEL 1562713) were at one time used as educational display sheets, while the others are duplicates sent to K and the botanist O.W. Sonder. Mueller also only collected on the summit of Mt Buller on the one occasion, during March 1853 and there is no reason to believe that he would have made more than the one collection. Indeed, it is evident from annotations on the MEL specimens that J.H. Willis agreed with this approach when he annotated them all as paratypes, a term both he and Davis used for isotypes.

**Typification of *B. squalida*.** The K sheet containing undoubted type material has many elements attached to it, all appearing to be of the same taxon, and four labels, all carrying Gunn's species number "706". There are no pencilled lines to indicate which labels belong to which specimens but the only label in accordance with the protologue has "*Brachycome squalida*, n. sp. 706/1842, Spring Hill 22/3/42" with the species name in, I believe, Hooker's hand and the rest of the label in Gunn's. Immediately above the label is a branch with four capitula attached, one of which is flowering, while to the left there is a larger element which is otherwise of very similar appearance. Together I consider them to constitute the holotype specimen of the name *B. squalida*. A specimen at NSW referred to by Davis (1948, p. 220) as a probable "merotype" I consider to be an isotype, the label in Gunn's hand differing only from that of the holotype in that it specifies that the specimen was from the "Top of" Spring Hills.

**Typification of *Steiroglossa rigidula*.** Cunningham's specimens in BRI, K and MEL from the south of Lake

George are all labelled as being collected in April 1824. Those in BRI and MEL lack an original label while the original Cunningham label on the specimen in K reads "A pretty blue flowering plant on Plains to the South of lake George Argyle N.S. Wales". This is very similar to the Cunningham label accompanying the holotype specimen in G-DC which reads "A Pretty blue flowering plant rare in loamy damp plains on the south of Lake George in N.S.Wales" suggesting that all such specimens are of the one gathering. The specimen in G-DC is clearly labelled as "No. 8" while all of the others are labelled as "25", a situation which could suggest that they are not of the same gathering. However, it transpires that the numbers are not specimen numbers, but shipping numbers, the number 25 being a shipping number for specimens sent from Cunningham to Aiton and Banks from Sydney in 1824, while 8 is the shipping number of specimens sent by Cunningham to Candolle (A.E. Orchard, pers. comm. 2013). Thus, the evidence suggests that they are highly likely to be of the same collection, a similar situation as noted by Orchard (2012) for the type of *Wedelia cunninghamii* DC.

**Notes.** Davis's concept of this species is here maintained but variation in habit, leaf and fruit morphology indicates that this is an inadequate treatment. For example, specimens from alpine regions of Victoria such as Mts Buller, Higginbotham, Hotham and Howitt, that have generally broader leaf segments than those from lower altitudes, are referable to Mueller's *B. multicaulis*, and do appear to represent a taxon worthy of formal recognition.

Cypselas are essentially monomorphic but the extent to which the cypselas wing develops is variable between plants and sometimes appears to be so even within capitula. When it is variable within capitula I suspect it is a reflection of immaturity or the fact that fruit are infertile rather than strictly dimorphic between ray and disc florets. However, I have seen at least one exception to this; *N.T. Burbidge 3989* (CANB) from Windellama in south-eastern N.S.W. has, at least on occasions, ray cypselas which are unwinged at maturity; the ray cypselas are also tuberculate while those of the disc have smooth surfaces. Disc florets of this specimen appear to have copious amounts of pollen and for this reason I leave it under *B. rigidula* sensu Davis.

### 23. *Brachyscome rudallensis* P.S.Short, sp. nov.

**Type:** Western Australia. Rudall River, 22°34'S, 122°11'E, in sandy loam by river, 18 May 1971, A.S. George 10648 (**holotype:** PERTH; **isotype:** CANB 290078).

Perennial herb to c. 30 cm tall, erect, branching at basal and upper nodes, major axes stiff, somewhat ribbed, mostly glabrous but with scattered stalked glandular hairs, including a few near-sessile glandular hairs (or sessile glands?) c. 0.02 mm tall often immediately below the capitula, and some cottony hairs mostly about the leaf axils, their bases usually not prominent. Leaves basal and cauline, mostly entire, linear-oblongate

to linear, 4–25 mm long, 0.5–2 mm wide, very rarely with some mostly near-basal leaves with 1 or 2 lobes, all leaves distinctly mucronate, mucrone whitish and 0.1–0.5 mm long, often glabrous or mostly so but some leaves with a conspicuous indumentum of cottony eglandular hairs and often stalked glandular hairs; stalked glandular hairs to c. 0.25 mm long, the larger ones distinctly triangular and multiseriate at base; eglandular hairs twisting, uniseriate and septate for much of their length but the bases may be prominent and multiseriate, the longest hairs c. 3 mm long. *Involucre* c. 3–5 mm diam. *Bracts* c. 12–25, usually in a single row (rarely a partial additional row), overlapping and of similar length, narrowly rhombic to sublinear, 2–3.7 mm long, 0.35–0.8 mm wide, mainly green but with very narrow hyaline and entire to irregularly serrated and sometimes purplish margins, outer surface with a prominent cover of stalked glandular hairs 0.02–0.2 mm long, the largest with multiseriate, somewhat triangular stalks. *Receptacle* hemispherical, areolate, glabrous. *Ray florets* c. 43; corolla c. 4.5 mm long, 0.75 mm wide, apically not or minutely 2-lobed, mauve; veins 3 or 4. *Disc florets* c. 64; corolla c. 1.5–2 mm long, yellow, 5-lobed. *Stamens* 5; anthers 0.78–0.86 mm long, lacking apical appendages, filament collar straight in outline and basally not thicker than the filament, c. 0.25 mm long, total filament c. 0.45 mm long; pollen grains not developed. *Style* c. 2.3 mm long; style arms c. 0.9–1 mm long, appendages lanceolate in outline and c. 0.6–0.65 mm long, the stigmatic part c. 0.3 mm long. *Cypselas* dimorphic, those of the disc florets with wing-like margins, all laterally flattened, all with eglandular, apically-curved hairs, glandular hairs absent; pericarp with 2 vascular bundles. *Ray cypselas* straight or curved through their length, obovate to oblanceolate in outline, 1.25–1.45 mm long, 0.4–0.45 mm wide, grey or grey brown but the minute surface papillae and tubercles whitish, lateral surfaces lacking longitudinal margins but with c. 10–20 free or slightly fused tubercles, each of which ends in an eglandular hair; ab/adaxial margins entire, unwinged and with a few eglandular hairs along their length, the hairs 0.7–0.22 mm long; carpopodium annular, 5-cells wide, whitish. *Pappus of ray florets* a whitish divided crown c. 0.06–0.08 mm high. *Disc cypselas* manifestly flattened, widely obovate to obovate or elliptic to widely elliptic in outline, 1.5–1.9 mm long, 1–1.2 mm wide, discolorous, with prominent wing-like margins; lateral surfaces of the fruit body with the central part brown, minutely papillate but essentially smooth except for c. 12–22 scattered eglandular hairs; wing-like margins 0.3–0.4 mm wide, cream, slightly inflated, edges entire or with shallow notching, with c. 15–20 eglandular hairs along each margin, hairs 0.08–0.26 mm long; carpopodium present, annular, white or cream. *Pappus of disc florets* of c. 10 uneven, long, smooth whitish elements c. 0.1–0.35 mm long. *Chromosome number*: unknown. **Fig. 2B, C, 22.**



**Fig. 24.** *Brachyscome tatei*, Eyre Hwy, near W.A.-S.A. border. — P.S. Short 2421.

**Distribution.** North-western Western Australia, being known from the Hamersley Range region and Rudall River National Park.

**Habitat.** The type specimen was collected “in sandy loam by river”, another on a “river levee” (A.S. Mitchell 763) while another (S. van Leeuwen 4734) was from a dense grass/herbland over “stony red clay loam with cracking clay-gilgai soils” and with dominants such as *Astelba pectinata*, *Iseilema membranaceum* and *Themeda triandra* Forrsk.

**Phenology and reproductive biology.** The specimens examined have at least some florets still attached but also have mature fruit and were collected in April, May and July.

Data concerning floral attributes (floret number, style and anther dimensions and pollen sterility) recorded in the above description was obtained from a capitulum removed from S. van Leeuwen 4734. No pollen was observed in anthers but apparently fertile fruit are well-developed in disc florets, indicating that the species is apomictic. Except for the lack of pollen the disc florets give the appearance of being bisexual, with the anthers generally well-developed and each of the stylar arms having a distinct stigmatic surface.

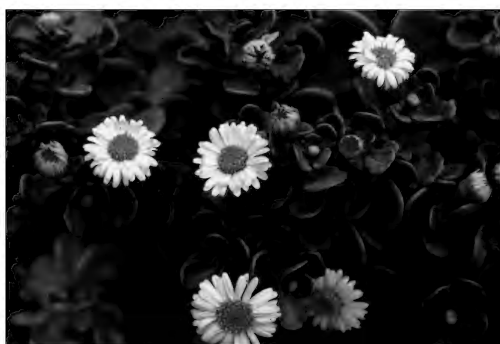


Fig. 25. *Brachyscome tatei*, Eyre Hwy, near W.A.-S.A. border. — P.S. Short 2421.

*Cytology*. No information recorded.

*Etymology*. Records the locality of the first specimen I examined of this species.

*Notes*. A distinctive taxon readily distinguished from most others in the *B. ciliaris* complex by its mostly entire leaves, a character which, following Davis (1948), would have placed it in *B. ciliaris* var. *integrifolia* from eastern Australia. That is a more rigid plant, which lacks the rigid, triangular-based glandular hairs found in this species. The wings of the cypselas of the disc florets in var. *integrifolia* are manifestly toothed, not entire or shallowly notched.

*Additional specimen examined*.

WESTERN AUSTRALIA: Mt Newman Flats, 7.1 km SE of Mt Newman, 16 July 2000, S. van Leeuwen 4734 (DNA, PERTH n.v.); Rudall River N.P., 28 Apr. 1979, A.S. Mitchell 763 (DNA, PERTH).

#### 24. *Brachyscome tatei* J.M.Black

Trans & Proc. Roy. Soc. South Australia 52: 227 (24 Dec. 1928) ("*Brachycome*"); J.M.Black, Fl. S. Austral. 1st ed. 585 (1929) ("*Brachycome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 211, Fig. 86, 98 (1948) ("*Brachycome*"); E.L.Robertson, J.M.Black's Fl. S. Austral., 853, Fig. 1152M (1965, rev. edn) ("*Brachycome*"); D.A. Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1456, Fig. 657c (1986) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 228, illustration 229 (1995). — **Type citation**: "Bunda cliffs (west of Fowler's Bay), coll. R. Tate; near Eucla, coll. J.D. Batt. Only known by 3 imperfect specimens in the Tate Herbarium." **Lectotype**: Eucla, J.D. Batt (AD 97631356 p.p., ex herb. R. Tate). (Davis 1948, p. 211). **Isolectotype**: Eucla, 1890, J.D. Batt (MEL 220535) or Eucla, 1889, J.D. Batt (MEL 220538). **Remaining syntype**: Bunda Cliffs, R. Tate (AD 97631356 p.p., ex herb. Tate). **Remaining isosyntype**: Stony places, top of Bunda Cliffs, 12 Feb. 1879, R. Tate (MEL 220548).

Perennial *subshrub*, semi-prostrate or procumbent and rounded. *Branches* becoming woody, glabrous or at least new growth may have minute, stalked glandular hairs. *Leaves* basal and cauline, alternate, sessile, obovate or spatulate, 12–65 mm long, 5–22 mm wide,

leaves entire or with 1–3 apically obtuse lateral lobes in c. the upper ½, formed from divisions extending less than ¼ the distance to the midrib (very rarely up to c. ½ way for the lower lobes), dull green, fleshy, glabrous or with scattered, very short, glandular hairs, often all or mostly all leaves lobed although sometimes mostly entire (G.C. Cornwall 276). *Peduncles* exceeding the leaves, glabrous or with shortly stalked glandular hairs. *Involucre* 7–12 mm diam. *Bracts* 18–22, in 1 or 2 rows, overlapping and c. the same length, mainly obovate, elliptic or somewhat oblong, 3–5 mm long, 1–2.2 mm wide, mainly herbaceous and green, may be slightly succulent when fresh, margins and apices not or barely hyaline, upper margins with stalked glandular hairs 0.02–0.04 mm long, outer surface glabrous or with scattered, microscopic glandular hairs. *Receptacle* convex to subconical, glabrous. *Ray florets* female, c. 37–83; corolla 6.1–9 mm long, 0.9–1.8 mm wide, with 3 or 4, rarely 5 veins, not or barely bilobed at apex, white or mauve. *Disc florets* bisexual, c. 60–130, corolla (1.7) 2–3 mm long, yellow. *Stamens* 5; anthers 1.1–1.25 mm long; apical appendage absent or almost so, less than 0.04 mm long; endothelial tissue radial; filament collar straight and basally not thicker than filament. *Style* arms 1.1–1.4 mm long, stigmatic part 0.23–0.5 mm long, appendage somewhat triangular. *Cypselas* laterally flattened, obovate, 1.5–2.0 mm long, 0.55–1.15 mm wide, unwinged but with thick ad/abaxial margins, entire fruit discolorous and usually strongly so; body dark greyish brown or dark greenish brown, smooth or very minutely papillate and sometimes with c. 12–30 small but distinct tubercles and usually with scattered, eglandular, whitish hairs c. 0.6 mm long and apically somewhat curled; ab/adaxial margins 0.1–0.2 mm wide, pale yellowish brown or pale greenish brown, smooth or with 1–6 teeth (minute lobes) along one or both margins, each tooth ending in an eglandular hair; testa cells with u-shaped thickening (P.S. Short 2421); carpopodium c. 5 cells (c. 0.06–0.08 mm) wide and usually slightly paler than the ab/adaxial margins. *Pappus* a minute, barely formed crown c. 0.4 mm high or absent. *Chromosome number*:  $n = 9$ . **Fig. 9F, 24, 25.**

*Distribution*. Restricted to coastal regions of the Great Australian Bight. Most specimens are from the South Australia coastline, with Batt's type specimens from Eucla the only ones I have seen from Western Australia. Given the proximity of the State border to Eucla and Batt's proclivity for walking (Short 1997) it may be that his cited location is a generalized one rather than specific one, with the species actually restricted to South Australia.

*Habitat*. Only known to me from the top of coastal limestone cliffs and collector's notes suggests that it is commonly not far-removed from them, although it has also been collected in sand at the head of the Bight (e.g. P.G. Wilson 1622). Associated with species such as *Disphyma crassifolium*, *Wilsonia backhousei*,

*Lawrenciella glomerata* and species of *Frankenia* and *Senecio*.

*Phenology and reproductive biology.* Herbarium specimen data indicate that both flowering and fruiting specimens may be found throughout the year, with May, June and December the only months for which there are no collections.

Pollen:ovule ratios ranging from 3,337 to 5,171 were estimated for five capitula of *P.S. Short* 3787.

Salkin et al. (1995) recorded that seed germinates moderately well in 7–40 days.

*Cytology.* Watanabe et al. (1996b, Fig. 1E) determined  $n = 9$ ,  $2n = 18$  for this taxon from a single population c. 40 kms East of the W.A./S.A. border. Watanabe et al. (1996a, Fig. 16) and Watanabe et al. (1999, Fig. 44) presented an idiogram of somatic metaphase chromosomes.

*Naming and typification.* Ferdinand Mueller, in a letter dated 22 November 1879 and held in the Barr Smith Library, University of Adelaide, informed Professor Ralph Tate that his

Brachycome from the cliffs of the Bight must be quite distinct from *B. graminea*, as your additional more developed specimen now proves. I wished much, that ripe fruit of it could be procured, as it may be a thick leaved form of a tender-leaved species, coast-plants usually becoming succulent. Should the species (on obtaining ripe fruit) prove new, I will be happy to name it after you

reproduced in Home et al. 2006, p. 169

At MEL there are two specimens attributed to Tate which were gathered from Bunda Cliffs and which relate to this letter. One of these (MEL 220549) was gathered on 15 Feb. 1874 and was originally labelled as *B. graminea* and is clearly the early specimen alluded to by Mueller. It is an immature specimen and is not of *B. tatei*, being attributed to *B. parvula* by Davis (1948) but most likely a specimen of, or with affinities to, *B. trachycarpa*. The other specimen (MEL 220548) from Bunda Cliffs is of *B. tatei* and was collected on 12 Feb. 1879, was originally labelled by Mueller as being “a remarkable variety of *Brachycome graminea*” and is presumably the “additional and more developed” specimen seen by Mueller. Subsequent to this correspondence Mueller received two collections of *B. tatei* which were gathered from Eucla by J.D. Batt. One (MEL 220538) collected in 1889 is merely labelled “*Brachycome*”, while the other (MEL 220535) was gathered in 1890 and is labelled as “*Brachycome Tatei* F.v.M.” in Mueller’s hand.

Despite Mueller’s stated intentions he never described this species and it was J.M. Black who formally named it after Tate. When naming it, Black gave no indication that he was aware of Mueller’s intentions and so the authorship is only attributable to Black (Art. 46.6). Although it has no bearing on authorship, there is indeed no external evidence that Black saw the Batt specimen at MEL which is labelled as *B. tatei* or was aware of the correspondence between Mueller and Tate.

When describing *B. tatei*, Black recorded that the species was only known to him by three ‘imperfect specimens’ in the Tate herbarium. There can be no doubt that one such imperfect specimen (now AD 97631356 p.p.) is part of a branchlet, less than 3 cm long and with one capitulum, removed from one of the two specimens in MEL gathered by Batt from Eucla. It resides within a folded envelope on this sheet and was subsequently designated as the lectotype of *B. tatei* by Davis (1948; annotated as such by Davis on 6 April 1945), leaving the original collection in MEL as an isoelectotype. From her publication it is clear that Davis (1948) believed that the lectotype had been removed from the 1890 collection (MEL 220535). This is also stated by her in a note, dated 19 Aug. 1944, attached to the specimen. However, it is evident that she did not see the 1889 collection, it neither being annotated by her or cited in publication. In fact, the 1889 and 1890 collections are not particularly dissimilar and it is not possible to unequivocally state from which one the lectotype specimen was removed; although the darker leaves suggest to me that it was most likely the 1889 specimen. Accordingly, I regard both of Batt’s specimens in MEL as being possible isoelectotypes of the name *B. tatei*.

Part of the lectotype specimen consists of a small packet labelled as containing immature fruit. It is mounted next to the branchlet within the larger envelope. On examination I found nothing but leaf fragments within the packet and no fruit remain attached to the capitulum which is totally devoid of florets. There are some immature fruit and florets stuck to Black’s original notes concerning this species and which are mounted on the sheet. It is not clear if they are from Batt’s collection or from Tate’s collection from Bunda Cliffs which is also mounted on the same sheet.

As noted, attached to the sheet containing the lectotype specimen there is material collected by Tate from Bunda Cliffs. This specimen consists of two branchlets – and as mentioned above, perhaps also some florets stuck to the original notes – and is a remaining syntype. A duplicate, a remaining isosyntype, is in MEL (MEL 220548) and it is the specimen of *B. tatei* to which Mueller was referring in his letter to Tate.

The only syntype material of the name *B. tatei* of which I am aware is that described above and attached to the sheet (AD 97631356) containing the lectotype specimen. I also assume that this is all that exists. As noted, in the protologue, Black made reference to “3 imperfect specimens in the Tate Herbarium” and I think it reasonable to assume that he was referring to the single branchlet of the lectotype specimen plus the two branchlets comprising Tate’s specimen from Bunda Cliffs.

*Notes.* Examination of the few collections with mature fruit indicates that the species exhibits considerable variation in cypsela morphology; the size, particularly width, is extremely variable; apically inrolled hairs and

small teeth or lobes on the ab/adaxial margins are usually absent, but present in at least some cypselas of a capitulum in, for example, *T.R.N. Lothian 3661*; and the cypselas body is commonly smooth except perhaps for minute papillae formed by crystals in the epidermal cells, however small but distinct tubercles are present on the lateral surfaces of some fruit. A comparatively short cypselas with what Davis described as “short lobes” on the ab/adaxial margin forms part of the possible isolectotype specimen collected by Batt in 1890 (MEL 220535) and it was from this specimen – called a “homoeotype” by Davis – that a cypselas was illustrated by her (Davis 1948, Fig. 98) and reproduced in the 2<sup>nd</sup> edition of Black’s *Flora of South Australia*. I have not seen other cypselas which exactly match it, although those from *G.C. Cornwall 276* and *P.S. Short 2421* are certainly not too dissimilar in colour and shape – but lack teeth – while those from *T.R.N. Lothian 3661*, although longer and narrower, sometimes have 1–5 teeth on the ab/adaxial margins.

In his original description Black (1928, p. 228) noted that “the narrower achenes are perhaps those of the ray”, suggesting that he too noted a resemblance of this species to other members of the *B. ciliaris* complex in which the cypselas of the ray florets are frequently narrow and unwinged, while those of the disc are broader and have wing or wing-like extensions on their ab/adaxial margins. However, although I have only seen a few capitula, this doesn’t appear to be the case, with at least some capitula only having narrow cypselas.

#### *Selected specimens examined.*

SOUTH AUSTRALIA: White Well, 9 Oct. 1954, *J.B. Cleland* (AD 97220043, AD 97220044, MEL 220536, NSW 30137); Head of Bight, 9 July 1961, *J.B. Cleland* (AD 97220042); 41 km E of WA border along Eyre Highway, 19 Nov. 1983, *P.S. Short 2421* (AD, MEL, PERTH).

#### **25. *Brachyscome tesquorum* J.M.Black**

Trans. & Proc. Roy. Soc. South Australia 40: 75, Fig. 8 (1916); J.M.Black, Fl. S. Austral. 1st ed. 584, pl. 47 (1929). G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 206, Fig. 75, 82, pl. vi, map 24 (1948); E.L.Robertson, J.M.Black’s Fl. S. Austral., 853, Fig. 1152K & 1153 (1965, rev. edn); Jessop, Fl. Centr. Austral. 369 (1981); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1458, Fig. 657 D (1986); E.Salkin et al., Austral. Brachyscomes 234 (1995). — **Type citation:** “Oodnadatta (Miss Staer); Glen Ferdinand, Musgrave Ranges (S. A. White).” **Lectotype:** Oodnadatta, Jan. 1913, *Staer* (AD 98421078 p.p., ex herb. J.M.Black). (Davis 1948, p. 206, Fig. 75). **Remaining or possible remaining syntypes:** Glen Ferdinand, Musgrave Ranges, 18 July 1914, *S.A. White ?209* (AD 98421078 p.p., ex J.M.Black); Glen Ferdinand, Musgrave Ranges, 1915, *S.A. White 3* (MEL 239432); no locality, date or collector specified (K 000882291, comm. J.M.Black 24 Jan. 1917), see below.

**Distribution.** Western Australia, southern arid areas of the Northern Territory, and South Australia north of about Oodnadatta.

**Cytology.** Smith-White et al. (1970; no vouchers seen) recorded  $n = 9$  & 18 for this species; Field et al. (2006) also recorded  $n = 9$ .

**Typification.** Kew (K) has a specimen of likely type status. An attached label recording that it was sent to K by Black in January 1917, soon after publication of the name, suggests that it is authentic material viewed by him when compiling his description. A label “No. 4. *Brachyscome tesquorum*” attached to the sheet appears to be in the same hand as the *S.A. White 3* (MEL 239432) specimen, which suggests it was gathered by White and that it is a remaining syntype.

**Notes.** The pericarp contains 2 vascular bundles and the cells of the testa have u-shaped thickening (*P.K. Latz 4323*).

Ray corolla are variously recorded on labels as being “blue”, “light blue”, “pale blue”, “mauve”, “purple but dull”, “white”, and “white above tinged lilac below”.

#### *Specimens examined.*

WESTERN AUSTRALIA: Blackstone Range Mining Camp, 8 July 1963, *A.S. George 4818* (PERTH).

NORTHERN TERRITORY: 29 km E of Horseshoe Bend Hmsd, 9 Nov. 1993, *D.E. Albrecht 5552* (MEL); c. 38 km NW of Wallara Ranch towards Kings Canyon, 19 Aug. 1989, *J. Barker DSG 26* (MEL 696895); c. 12 miles N of Alice Springs, 26 Sept. 1955, *N.T. Burbidge & M. Gray 4353* (AD, BRI, CANB, 2 sheets, NSW); 5 miles W of Mt Riddock Hmsd, 1 Oct. 1955, *N.T. Burbidge & M. Gray 4493* (PERTH); Mt Phillips, Petermann Ranges, 18 Aug. 1966, *R.C. Carolin 5272* (SYD); MacDonald Downs Station, 1932, *J. Chalmers 38* (AD); 38½ miles SW Tobermorey Hmsd, 20 Sept. 1956, *G.M. Chippendale NT 2761* (BRI, CANB, DNA, NSW); 2½ miles N trucking yards, Alice Springs, 11 Oct. 1956, *G.M. Chippendale NT 3041* (DNA); trucking yard area, Alice Springs, 15 Oct. 1956, *G.M. Chippendale NT 3052* (CANB, DNA, NSW); 6 miles S Harts Range Police Stn, 8 July 1957, *G.M. Chippendale NT 3448* (DNA); 17 miles SW Huckitta Homestead, 13 Aug. 1959, *G.M. Chippendale NT 6511* (AD, DNA); slopes of Mt Liebig, 12 Aug. 1932, *J.B. Cleland* (AD 97220046); Haast’s Bluff Reserve, 30 Aug. 1957, *J.B. Cleland* (AD 966060553); Davenport Range, Elkedra River (or tributary) crossing, 14 Aug. 1978, *N.N. Dommer 6250* (AD, CANB); Marqua Stn, 24 May 1972, *C.R. Dunlop 2298* (AD, CANB, DNA, NSW); Mt Doreen Stn, 16 Jan. 1972, *C.R. Dunlop 2407* (AD, CANB, MEL); Standley Chasm, 22 Sept. 1956, *N.G. Eddy NT348* (DNA); Arltunga NP, 23 March 1977, *T.S. Henshall 1323* (DNA); James Range, 24 Aug. 1931, *E.H. Ising* (AD 97245246); Horseshoe Bend, 24 Aug. 1931, *E.H. Ising* (AD 97411134); Finkes River, 1880, *Kempe* (MEL 692631); top of Mt Liebig, *Kramer* (AD 97220047); Riddock Stn, 13 Sept. 1973, *P.K. Latz 4323* (DNA); Andado Stn, 15 April 1977, *P.K. Latz 6784* (DNA); 13 km NE of Kings Canyon, 21 July 1981, *P.K. Latz 8859* (DNA); Rodinga Range, 7 Sept. 1992, *P.K. Latz 12661* (MEL); Atherrita Bore, 6 Sept. 1965, *D.J. Nelson 1428* (DNA, NSW); 16–19 km N Alice Springs, 23 June 1968, *C.E. Rix 55* (AD); Napperby Stn, Aug. 1955, *N. Sim* (AD 96803572, AD 96804257); 7 km E of Alice Springs, 12 Oct. 1996, *K. Watanabe 675* (MEL); Gosse’s Bluff, 26 July 1966, *J.H. Willis* (MEL 2034558).

SOUTH AUSTRALIA: between Marla and Granite Downs, 6 July 1989, *R. Bates 19516* (AD); Macumba Stn, c. 50 km N of Oodnadatta, Nov. 1950, *E.H. Ising 3857* (AD); c. 20 km S of Cheeseman’s peak turnoff, c. 80 km S of Mt Lindsay, 7 Aug.

1962, R.H. Kuchel 330 (AD); c. 1 km W of Officer Creek, 13 Sept. 1986, P.J. Lang 1745 (AD); foothills of Emery Ranges, c. 22 km E of Pedirka, 27 July 1968, T.R.N. Lothian 4788 (AD); scree face of Mt Alexander, 18 Sept. 1974, D.E. Symon 9088 (AD, NSW); Coober Pedy Tank, 10 Sept. 1960, H. Turner (AD 97605325).

## 26. *Brachyscome trachycarpa* F.Muell.

Linnaea 25: 399 (Apr. 1853) ("*Brachycome*"); Benth., Fl. Austral. 3: 515 (5 Jan. 1867) ("*Brachycome*") p.p., excl. specimens from Qld (*B. basaltica*), Vic. (*B. parvula*); J.M.Black, Fl. S. Austral. 1st ed. 583, Fig. 245G (1929) ("*Brachycome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 174, Fig. 36, pl. vi (1948) ("*Brachycome*"), p.p., excl. Qld & Vic. specimens and at least Dallachy's N.S.W. specimen; E.L.Robertson, J.M.Black's Fl. S. Austral., 853, Fig. 11521 (1965, rev. edn) ("*Brachycome*"), p.p., excl. ref. to "South-East"; J.H. Willis, Handb. Pl. Victoria 2: 667 (1973) ("*Brachycome*") p.p., excl. cited Vic. locations which were based on misidentifications; G.M.Cunningham et al., Pl. W. New South Wales 652, Fig. 64t (1981) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1458, Fig. 657E (1986) ("*Brachycome*"); J.Everett in G.J.Harden, Fl. New South Wales 3: 158 (1992) ("*Brachycome*"), at least not as to Qld & NWP distribution; E.Salkin et al., Austral. Brachyscomes 238 (1995), excl. Qld specimens; P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 858, Fig. 174e (1999). — **Type citation**: "Ad rivulus Crystal brook et Cudnaka." **Lectotype**: Crystal Brook, Oct. 1851, F. Mueller (MEL 1556208 p.p.). (Davis 1948, p. 218, Fig. 92). **Isolectotypes**: MEL 1556208 p.p. **Remaining syntype**: Cudnaka, Oct. 1851, F. Mueller (MEL 220530, NSW 15525).

Perennial herb or subshrub 20–45 cm tall, branches erect, stiff, somewhat ribbed, glabrous or with scattered, stalked glandular hairs c. 0.08–0.15 mm long, the stalks cylindrical to distinctly conical and multiseriate at base. *Leaves* cauline, rigid, mostly linear or linear-oblongate, 3–50 mm long, 0.5–2.5 (3) mm wide and entire, sometimes with 1–4 (6) lateral lobes to c. 2.5 mm long and then the leaves to 6 mm wide, the uppermost leaves often markedly smaller and sometimes ovate or subtriangular; all leaves submucronate, glabrous or with shortly stalked glandular hairs as on branches. *Involucre* 3–5 mm diam. *Bracts* 12–20, in c. 1 row and of similar length or some outer bracts shorter, somewhat elliptic or obovate, 1.8–3.2 mm long, 0.5–1 mm wide, mainly green but with scarious, often purplish margins, with stalked glandular hairs on surface and margins. *Receptacle* subconical to conical, areolate, glabrous. *Ray florets* c. 15–22; corolla c. 3–5 mm long, white or variously described as pale blue, mauve, pale violet or purple. *Disc florets* perhaps always more than ray florets; corolla 1.45–1.9 mm long, yellow, 5-lobed. *Stamens* 5; anthers lacking apical appendages. *Style appendages* triangular or narrowly triangular and longer than the stigmatic part. *Cypselas* monomorphic, somewhat flattened, obovate, 1.4–1.7 mm long, 0.55–0.7 mm wide, unwinged, with broad ad/abaxial margins, shades of brown or grey-brown; cypselas body tuberculate and with biseriate, curving to manifestly apically

curled, whitish eglandular hairs c. 0.05–0.08 mm long, tubercles c. 7–25 on each lateral surface; ab/adaxial margins smooth, glabrous or with scattered eglandular hairs as on body; pericarp with 2 vascular bundles and with a continual layer of sclerenchyma surrounding the testa; cells of testa with u-shaped thickening (*J.Z. Weber 6594B*); carpopodium present. *Pappus* a short crown 0.1 mm long. *Chromosome number*:  $n = 18$ . **Fig. 2D, 9G.**

**Distribution.** Mostly arid and semi-arid regions of southern Australia between c. 29° and 35°S and from about Kalgoorlie (W.A.) east to the extreme south-west of New South Wales and the Raak Plain in north-western Victoria. The distribution includes islands of the Nuyts Archipelago near Ceduna, S.A.

A specimen, seemingly of this species, which is attributed to A.R.R. Higginson (AD 966060815) and recorded as coming from Portland, Victoria represents a major disjunction in distribution. It is here assumed to be mislabelled, a conclusion supported by the fact that some other specimens collected by Higginson in Nov. 1955 and stated to be from Portland are of species – such as *Eremophila longifolia*, *Cullen australasica*, *Scaevola humilis* and *Zygophyllum crenatum* – which are also unlikely to occur in this area (R.M. Barker & J. Kellermann, pers. comm., Aug. 2014).

**Habitat.** Commonly recorded from open mallee woodland or shrubland (with dominants such as *Cratystylis conocephala*, *Dodonaea* spp. and assorted chenopods) and usually noted as growing in loam or sandy loam and often over limestone.

**Phenology and reproductive biology.** Flowering and fruiting specimens are mostly recorded from August to October but they may be encountered in other months.

The only accurate count of floret ratios indicates that there are fewer ray than disc florets, with 17 ray and 36 disc florets in a capitulum of J.H. Browne 523 from Raak Plain.

**Cytology.** Chromosome numbers of  $n = 18 + 0-2$  Bs (Watanabe et al. 1996b, for specimens from Ceduna, S.A.) and  $2n = 36$  (Carter 1978a, from Caiguna Tank, W.A.) have been recorded. An idiogram of somatic metaphase chromosomes for material from Ceduna (*P.S. Short 3781*) was published by Watanabe et al. (1996a, Fig. 14) and Watanabe et al. (1999, Fig. 43).

De Jong (1963), giving no locality details and citing no voucher specimen, recorded  $n = 27$  for this species.

**Notes.** Cooke (1986) noted that plants collected from islands of the Nuyts Archipelago have a particularly compact habit and comparatively thicker, and perhaps somewhat fleshy, leaves. He did not formally name this variant and the dwarfing suggests that the features are primarily a response to a harsh coastal environment, including salt-laden winds.

### *Selected specimens examined.*

WESTERN AUSTRALIA: 122 km S of Neale Junction, 15 July 1974, *George 11918* (PERTH); Plumridge Lakes Nature

Reserve, 13 Apr. 1984, *Keighery 7205* (PERTH); W boundary of Kananda Stn, 18 Oct. 1986, *G.J. Keighery & J.J. Alford 848* (PERTH).

SOUTH AUSTRALIA: Mt Grainger, 5 Sept. 1974, *R.J. Chimmock 1700* (AD, CANB); Ceduna, opposite Pine Grove Motel, 12 Sept. 1990, *P.S. Short 3781* (AD, MEL); Lake Gilles C.P., 10 Oct. 1986, *A.G. Spooner 10346* (AD); Masillon Island, 5 Jan. 1971, *N.M. Wace 11* (AD); NW of Ooldea, [c. 30°27'S, 131°50'E], 30 Aug. 1980, *J.Z. Weber 6594B* (AD).

NEW SOUTH WALES: Darling River, *J. Dallachy* (MEL 692629); 9 miles W of Euston, Oct. 1966, *J.H. Leigh W12* (NSW).

VICTORIA: c. 34 km S of Red Cliffs, 25 Aug. 1988, *J.H. Browne 516* (MEL); Raak Plains, 21 Sept. 1988, *J.H. Browne* (MEL 1560591).

## 27. *Brachyscome xanthocarpa* D.A.Cooke

J. Adelaide Bot. Gard. 7: 273, Fig. 1 (1985) ("*Brachyscome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1458, Fig. 657G (1986) ("*Brachyscome*"); E.Salkin et al., Austral. Brachyscomes 244 (1995). — **Type citation:** "Hincks National Park, Hd. of Nicholls, c. 2 km E of north/south track and c. 4 km N of the southern boundary, 11.x.1968, *J.R. Wheeler 1039* (**Holotype:** AD 96925131)."

Annual herb; major axes ascending to erect, 4.5–14 cm long, branching at basal and upper nodes, each axis terminating in a capitulum and leafless for most of their length, green to reddish; indumentum of mostly scattered eglandular, whitish, biseriate, septate hairs with a bifid apex. *Leaves* basal and cauline, alternate but the lowermost opposite; first-formed and sometimes the last-formed leaves entire, other leaves 1-pinnatisect and with 3–9 lobes, all leaves 0.3–2 cm long, 0.1–0.6 cm wide, green, indumentum of scattered to moderately dense stalked glandular hairs and eglandular bifid hairs as on branches. *Involucre* 2–5 mm diam. *Bracts* 8–15, in 1 row, overlapping, obovate to narrowly obovate or elliptic, 1.3–3 mm long, 0.6–1.3 mm wide, glabrous, sterome mainly herbaceous and the margins and apices hyaline and sometimes purplish. *Receptacle* convex to slightly conical, areolate, glabrous. *Ray florets* 11–18. *Ray corolla* 4–6 mm long, 0.8–2 mm wide, white; tubular part with a few biseriate glandular hairs; veins 4 (5); apex minutely and barely 2 or 3-lobed. *Disc florets* 14–39, corolla 1.4–2.3 mm long, yellow, externally with a few biseriate glandular hairs. *Stamens* 5; anthers 0.65–0.9 mm long, microsporangium 0.58–0.83 mm long, terminal appendage little more than an extension of the connective, 0.04–0.09 mm long; endothelial tissue with radial thickening; filament collar straight in outline and basally not thicker than the filament. *Style arms* 0.65–0.92 mm long; appendages triangular, 0.4–0.49 mm long, longer than the stigmatic part; stigmatic surface 0.24–0.43 mm long. *Cypselas* monomorphic, ovate, 1.4–1.7 mm long, 0.4–0.5 mm wide, straight or slightly curved throughout their length, laterally compressed, with broad ab/adaxial ribs, lateral surfaces with large tubercles throughout, at least the upper tubercles usually with a few curved to apically-curved eglandular hairs; entirely yellow-brown or the ab/adaxial ribs somewhat greenish

and the tuberculate lateral surfaces somewhat yellow or yellow-brown; pericarp with 2 vascular bundles and with sclerenchyma throughout the broad ab/adaxial ribs; testa cells uniformly thickened (*D.E. Symon 6299*); carpogonium annular. *Pappus* crown-like, 0.3–0.4 mm long, white. *Chromosome number:*  $n = 9$ . **Fig. 2E.**

**Distribution.** Confined to Eyre Peninsula, South Australia. Collected in the Venus Bay/Streaky Bay region in 1865 but not collected again until 1955 from Smoky Bay, in 1968 from Hincks Conservation Park, and in 1972 from c. 5 km west of Ceduna.

**Habitat.** Information is sparse. At Hincks Conservation Park recorded as growing in calcareous sandy loam in a mallee eucalypt tall shrubland with an understorey of *Triodia* (*P.S. Short 3907*).

**Phenology and reproductive biology.** Flowering is recorded from late August to early October.

Pollen:ovule ratios, determined from five individuals of *P.S. Short 3907*, ranged from 970 to 2,174. Pollen counts, which ranged from 1,582–3,310, could only be obtained from the last, or nearly last-formed, disc florets in plants gathered during a season of poor rainfall. Hence, these values may be lower than normal.

Salkin et al. (1995) recorded germination in c. 40 days and that percentage germination was poor.

**Cytology.** A diploid chromosome number of  $2n = 18$  was reported for this species and an idiogram of somatic metaphase chromosomes was published by Watanabe et al. (1999, Fig. 45). The idiogram was based on a specimen gathered from the vicinity of Streaky Bay (*E. Salkin 175, n.v.*).

**Notes.** Within *Brachyscome* s.lat. the apically bifid hairs of the general indumentum are unique to this species.

The large tubercles on the cypselas are late-developing.

### *Additional specimens examined.*

SOUTH AUSTRALIA: Venus & Streaky Bay, 1865, *B.H. Babbage* (MEL 116034); 2 miles from Smoky Bay, 25 Aug. 1955, *F.M. Hilton* (AD 98419172 p.p., mixed with *B. lineariloba*); c. 2 km north of the southern boundary of Hincks Cons. Park, 4 Oct. 1990, *P.S. Short 3907* (AD, MEL, TI); 5 miles W of Ceduna, 6 Sept. 1972, *S. Smith-White 8869–8876* (SYD, 2 sheets); Hincks N.P., 10 Oct. 1968, *D.E. Symon 6299* (AD); Hincks N.P., 2 km north of the southern boundary, 10 Oct. 1968, *J.R. Wheeler 982* (AD).

## *Brachyscome decipiens* group

*Brachyscome decipiens* group: P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 845 (1999).

A single species, perhaps deserving of generic rank; see notes below.

## 28. *Brachyscome decipiens* Hook.f.

Hooker's London J. Bot. 6: 114 (1847) ("*Brachyscome*"); Hook.f., Fl. Tasman. 1: 184, pl. 47 (1856) ("*Brachyscome*"); Benth., Fl. Austral. 3: 517 (1867) ("*Brachyscome*"); G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 155, Fig.



6, 10, pl. vi, map 3 (1948) ("*Brachyscome*"); W.M.Curtis, Stud. Fl. Tasman. 295 (1963) ("*Brachyscome*"); J.H.Willis, Handb. Pl. Victoria 2: 664 (1973) ("*Brachyscome*"); D.A. Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1451 (1986) ("*Brachyscome*"); J.Everett in G.J.Harden, Fl. New South Wales 3: 161 (1992) ("*Brachyscome*"); E.Salkin et al., Austral. Brachyscomes 86 (1995); P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 845, Fig. 170e (1999). — **Type citation:** "Abundant; Lawrence, Gunn: — v.v.n." **Syntypes:** Launceston, 28 Sept. 1841, R.C. Gunn 511/1842 (K 000882234, herb. Hookerianum 1867); Glen Leith, 14 Sept. 1840, ? J.D. Hooker (K 000882231, herb. Hookerianum 1867); New town, Hobarton, 23 Sept. 1840, ? J.D. Hooker (K 000882232, herb. Hookerianum 1867); J.D. Hooker 1164 (K 000882233), central part of label with "*Brachyscome decipiens* n. sp." in what I assume to be Hooker's hand; above the label and written directly on the sheet is "Tasmania" [K 000882231-K 000882234 are on the one sheet.]; Macquarie Plains, 10 Sept. 1842, Anon. sub R.C. Gunn 511 (K 000882226, herb. Hookerianum 1867; see note below); Hampshire Hills, R.C. Gunn 511? & 511, Lawrence 132 (K 000882227, herb. Hookerianum 1867, see note below) [preceding two specimens on the same sheet and with pencilled illustrations, labelled "*Brachyscome decipiens*" in Hooker's hand]; Van Diemen's Land, R.C. Gunn 511 (K 000882228, ex herb. Benthamianum 1854; a printed label with "Sir W. J. Hooker, 1838"); Tasmania, Antart. Expdn 1839–1843, J.D. Hooker (K 000882229, ex herb. Benthamianum 1854, with a printed label & annotated by Hooker as *B. decipiens*) [Two preceding specimens on the same sheet]; Tasmania, Antart. Expdn 1839–1843, J.D. Hooker (W, species name seemingly in Hooker's hand); Tasmania, R.C. Gunn (W, being three sheets, each label with the printed words "Ex. Herb. Hook. / Herb. Tasmania/ Coll. R.C. Gunn" and the species name seemingly in Hooker's hand). **Possible syntypes or isosyntypes:** Tasmania, R.C. Gunn (DBN, ex TCD, with a printed label); Tasmania, R.C. Gunn (E 00413405, three plants all lacking capitula, ex herb. Hooker; NY 00162719, ex herb. A. Gray); VD Land, R.C. Gunn 511 (E 00413406, ex GL, no indication that it was seen by J.D. Hooker; W); R.W. Lawrence 132 (HO 99483).

Perennial, scapose herb. *Leaves* obovate to oblanceolate or narrowly elliptic, 20–190 mm long, 5–37 mm wide, entire or c. the upper ½ serrate, glabrous. *Scapes* 1–6 per rosette, 10–30 cm long, longer than the leaves, glabrous, usually lacking leaf-like bracts but sometimes one present. *Involucre* 10–20 mm diam. *Bracts* c. 25, in 2 rows with bracts of unequal length, outer shorter than the inner, elliptic or lanceolate, 5.5–9 mm long, 1.5–4 mm wide, margins with glandular hairs and usually conspicuously purplish. *Receptacle* convex, glabrous. *Ray florets* c. 40–45, 9–11 mm long, white or white above, mauve below and sometimes recorded as drying blue. *Disc florets* 5-lobed, yellow. *Stamens* 5; anthers 1.3–1.43 mm long, microsporangia 1.07–1.16 mm long, apical appendages irregularly ovate or somewhat trullate, 0.22–0.32 mm long, filament collar straight in outline and basally not thicker than the filament. *Style* 3.2–3.6 mm long, branches 0.9–1 mm long, sterile apical appendages triangular to widely deltate and 0.36–0.4 mm long; stigmatic portion 0.56–0.62 mm long. *Cypselas* laterally compressed, flat, obovate, 2.3–4.6

mm long, 1.2–1.7 mm wide, brown, with eglandular, flat, weak, biseriolate, bifid hairs on the lateral surfaces, some small glandular hairs may also be present; pericarp with 2 vascular bundles, sclerenchyma confined to the ab/adaxial margins around the vascular bundles; testa cells with somewhat evenly thickened walls (D.E. Albrecht 254); carpogonium distinct, annular. *Pappus* of c. 20 connate bristles 0.2–0.3 mm long. *Chromosome number:*  $2n = 18, 54$ . **Fig. 2F, 10A, B.**

**Distribution.** New South Wales, Australian Capital Territory, Victoria, Tasmania and perhaps south-eastern South Australia.

The South Australian record was accepted by Cooke (1986) and may be correct as the species occurs in the neighbouring Casterton region in south-western Victoria. However, the sheet on which the S.A. record is based (MEL 674642) contains just one plant but two labels, each bearing the name *Brachyscome decipiens* but one indicating that the plant was gathered from "Compton, near Mt Gambier" in South Australia, the other recording "Glenelg". The latter locality is presumably in reference to the Glenelg River which, except for a very short part of its course, flows through Victoria, not South Australia.

**Habitat.** Ranges from alpine herbfield and heath e.g. Bogong High Plains, to subalpine woodlands and lowland grassland and woodland.

**Phenology and reproductive biology.** Flowers as early as September in lowland situations and as late as March in alpine and subalpine regions. The large capitula are indicative of cross-pollination.

Salkin et al. (1995) indicated that seed germinate well in 11–40 days.

**Cytology.** A chromosome number of  $2n = 54$  was recorded by Solbrig et al. (1964) from the Mt Kosciuszko region but other determinations are of  $2n = 18$ , these being recorded at Sawyers Hill (Watanabe et al. 1996b), Eucumbene and Kiandra (Smith-White et al. 1970). Idiograms of diploid somatic metaphase chromosomes were published by Watanabe et al. (1996a, Fig. 9) and Watanabe et al. (1999, Fig. 1, 20, including a photomicrograph of mitotic chromosomes).

**Typification.** Davis (1948, p.156), not having seen syntype material at K, did not select a lectotype specimen. I too, have refrained from lectotypifying as all three sheets at K which were evidently examined by Hooker contain multiple collections and the best specimens are not clearly affiliated with any given label. However, I consider them all to be of the same taxon.

Ronald Gunn used species numbers and also labelled specimens received from associates with his species number (Buchanan 1990). A specimen at K (K 000882227) appears to be an example where Robert Lawrence made the original collection and Gunn's species number has been added, i.e. it is labelled as "Gunn/Hampshire Hills 511?/ & 511/Lawrence 132"



The close proximity of this label to illustration of the taxon, plus the descriptive notes attached to the sheet, make this specimen an obvious candidate for lectotypification. I have refrained from designating it as such, partly because it is unnecessary, but also because it is not clear which elements comprise the specimen, other elements on the sheet labelled as coming from Macquarie Plains (K 000882226) and Argyle (K 000882225) not being clearly demarcated. It is also evident that the elements from Macquarie Plains, which are labelled *Gunn 511* and dated 10 Sept. 1842 were not collected by Gunn, his known itinerary (Buchanan 1990) placing him in the vicinity of Launceston on that date.

The status of unnumbered Gunn specimens is obviously unclear but there are other specimens numbered as *Gunn 511* which I have not considered to be isotypes, as none, as indicated by either their date of collection, collector or location, are a complete match in detail for those syntype specimens which were viewed by Hooker and have specified locality and dates of collection. Thus, I exclude NY 00162720, a specimen from Launceston collected on 7 Sept. 1839, as the syntype specimen from Launceston was collected on 28 Sept. 1841. (There is also no indication on the NY specimen that it was seen by Hooker). Of the specimens once housed in Gunn's private herbarium, which are now housed in HO and NSW (Buchanan 1990), I exclude a Gunn specimen in HO from type status as, although labelled as being collected on 28 Sept. 1841, unlike the K specimen it is not labelled as coming from Launceston but from Penquite. Of specimens of *R. Gunn 511* in NSW I exclude those numbered from NSW 15109 to NSW 15115 for similar discrepancies in labelling.

In the original publication Hooker made it clear, by noting "v.v.n.", that he had seen specimens in the living state and I have therefore listed his own specimens as syntypes.

**Notes.** A distinctive species, the monomorphic smooth cypselas which lack ridges and wings or wing-like appendages and which have weakly bifid hairs, combined with its scapose habit and generally biseriate involucre of bracts, readily distinguishing it from all other species. Cypselas morphology, specifically the lack of ridges and wing-like margins, suggests affinities with members here placed in the *Paquerina* group.

Many alpine collections have larger bracts and fruits than non-alpine specimens, a situation perhaps associated with the observed polyploidy (Solbrig et al. 1964).

#### *Selected specimens examined.*

NEW SOUTH WALES: Gourcock Range, 31 Oct. 1973, *R. Pullen 8559* (CANB, NSW).

AUSTRALIAN CAPITAL TERRITORY: Mt Gingera, 29 Nov. 1966, *M. Evans 2569* (CANB, MEL).

VICTORIA: Omeo Plains, 22 Jan. 1989, *M.G. Corrick 10433* (MEL); Lost Plain, 14 Jan. 1965, *T.B. Muir 3758* (MEL).

TASMANIA: Peak Plain, south of St Valentine's Peak, 13 Jan. 1986, *P. Collier 1175* (HO); Petal Point, 7 Oct. 1983, *A. Moscal 3233* (HO); Mt Nelson, 13 Nov. 1978, *B. Robinson* (HO 28293).

### *Brachyscome dentata* group

*Brachyscome dentata* group: P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 845 (1999).

*Brachyscome debilis* group: P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 844 (1999).

Perennial or annual, non-rhizomatous herb with basal and cauline leaves. *Ray corolla* yellow, at least in bud; mature white rays often drying yellow. *Disc florets* bisexual; corolla 5-lobed, yellow. *Stamens* 5, anthers with apical appendages. *Cypselas* monomorphic or dimorphic between plants, thin, flat to incurved, longitudinal ridges absent, usually with wing-like margins, apically-curved eglandular hairs present. *Pappus* a short crown. *Chromosome number*:  $x = 4$ .

**Distribution.** Temperate to arid regions of eastern mainland Australia. Four species, *B. curvicarpa*, *B. georginensis*, *B. papillosa* and *B. tetrapterocarpa*, are or tend to be, restricted to particular drainage basins.

**Notes.** This is a group defined by having, at least in bud, yellow – not white or shades of blue or pink – ray corollas and a base chromosome number of  $x = 4$ . Cypselas morphology is similar to that of members of the *B. aculeata* complex, but species of that complex are rhizomatous herbs with a chromosome base number of  $x = 9$  and ray corollas are white or blue.

One new taxon, *B. georginensis*, is included within this group. *Brachyscome dentata*, and to a lesser extent, *B. chrysoglossa*, are highly variable and further research may lead to the recognition of more taxa.

### 29. *Brachyscome chrysoglossa* F.Muell.

Defin. Austral. Pl. 11 (June–July 1855), preprint from Trans. Philos. Soc. Victoria 1: 44 (Sept. 1855), reprinted in Hooker's J. Bot. & Kew Gard. Misc. 8: 148 (1856), see Seberg (1986) for dates of publication; E.Salkin et al., Austral. Brachyscomes 66 (1995), including "*B. aff. curvicarpa*"; P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 845, Fig. 170f (1999). — *Brachyscome marginata* var. *chrysoglossa* (F.Muell.) G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 190 t. vi, map 18 (1948); J.H.Willis, Handb. Pl. Victoria 2: 676 (1973). — *Brachyscome heterodonta* var. *A. J. Everett* in G.J. Harden, Fl. New South Wales 3: 166 (1992), citing *B. marginata* var. *chrysoglossa* in synonymy. — **Type citation**: "In the Mallee scrub towards the north-western boundaries of the colony." **Holotype**: Murray scrub, 1850, *F. Mueller* (MEL 1552394).

*Brachyscome curvicarpa* var. (yellow-flowered): Smith-White et al., Austral. J. Bot. 18: 104, 116 (1970).

*Brachyscome* aff. *curvicarpa* (yellow ray florets): K.Watan & P.S.Short, Muelleria 7: 457–471 (1992); E.Salkin et al., Austral. Brachyscomes 80 (1995).

[*Brachyscome curvicarpa* auct. non G.L.R.Davis: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 192 (1948), p.p.; J.H.Willis, Handb. Pl. Victoria 2: 674 (1973); G.M. Cunningham et al., Pl. W. New South Wales 650 (1981), p.p., as to expanded yellow ray corollas.]

Perennial herb, erect, (12) 15–30 (38) cm tall, much of the plant often glabrous but frequently with a scattered to dense vestiture of stalked glandular hairs



Fig. 26. *Brachyscome chrysoglossa*, 40km S of Augathella, Qld. — P.S. Short 3155.

0.05–0.3 mm long on the scape. *Leaves* basal and cauline, 1–11 cm long, 0.2–1.8 cm wide, oblanceolate or narrowly elliptic, entire or often with the upper section pinnatifid or pinnatipartite, with 3–5 (12) lobes, sometimes with 1–2 small lobes in the lower part of the leaf, rarely leaves with secondary lobes, all leaves glabrous or with eglandular cottony hairs and/or stalked glandular hairs 0.05–0.2 mm long, the uppermost leaf usually with a scarious apex. *Peduncles* with shortly stalked glandular hairs, usually dense immediately beneath the capitulum. *Involute* 5–9 mm diam. *Bracts* 13–24,  $\pm$  uniseriate, mainly obovate or elliptic, 2.5–5.9 mm long, 0.7–3.1 mm wide, mainly green, margins scarious, often purplish, outer surface glabrous or with scattered, shortly stalked glandular hairs. *Receptacle* convex to subconical, areolate, glabrous. *Ray florets* 28–91; corolla 5.1–9.2 mm long, 1–2.1 mm wide, 3-lobed, with 4 veins, yellow. *Disc florets* 71–208; corolla 1.6–3 mm long, yellow. *Stamens* 5; anthers 1–1.4 mm long, microsporangia 0.76–1.23 mm long, apical appendages 0.12–0.27 mm long, filament collar about straight in outline, basally not thicker than the filament. *Style* 1.79–2.19 mm long, branches 0.69–0.88 mm long, sterile appendages narrowly triangular and about the length of the stigmatic portion. *Cypselas* monomorphic, thin, flat to somewhat incurved, widely obovate or obovate, 1.7–2.9 mm long, 1.3–2.1 mm wide, light brown or yellow-brown at maturity (sometimes pale greenish but perhaps not fully mature); lateral surfaces of fruit body smooth or almost so but with short, barely curled, eglandular hairs and commonly some glandular hairs, eglandular hairs with minutely swollen bases; wing-like margins present, 0.2–0.4 mm wide, slightly inflated, entire or variously dissected, with curled biseriate hairs on the edges; pericarp with 2 vascular bundles; testa with thin-walled cells (P.S. Short 3052); carpodium present, annular. *Pappus* bristles c. 10, white, 0.1–0.35 mm long. *Chromosome number*:  $n = 4$ . Fig. 2G, H, 26.

*Distribution*. Occurs on but mostly to the west of the Great Dividing Range, extending from western Victoria through New South Wales and into Queensland to as far north as c. 22°S.

*Habitat*. Grows in open woodlands with dominants such as Red Gum and Coolabah in grasslands often dominated by species of *Sporobolus* and *Dichanthium*, and usually, if not exclusively, occurs on clay soils subject to inundation.

*Reproductive biology*. Apparent pollen sterility ranging from zero to as much as 72% has been observed in this species and as a result pollen:ovule ratios were found to be quite variable. Combined data sourced from 16 capitula of P.S. Short 3155 and P.S. Short 3587 provided a range from 509 to 3,723. Watanabe & Short (1992) recorded that pollen sterility seems to be correlated with an increase in the number of pollen mother cells with B chromosomes.

Salkin et al. (1995) recorded that seed germinates in 10–40 days.

*Cytology*. Chromosome numbers of  $n = 4$  and  $2n = 8 + 0-3Bs$  have been reported from the northern part of the species' range, being from near Bollon, Charleville, Cunnamulla and Wyandra in Qld and from the vicinity of Narromine in New South Wales (Smith-White et al. 1970, as *Brachyscome curvicaarpa* var. (yellow-flowered); Watanabe & Short 1992, Fig. 1H, as *B. aff. curvicaarpa* (yellow ray florets). No vouchers of specimens examined by Smith-White and his colleagues have been seen, and probably do not exist, but their reference to a yellow-flowered variety leaves no doubt that determinations were for this species.

Idiograms of somatic metaphase chromosomes were published under the name *Brachyscome chrysoglossa* by Watanabe et al. (1996a, Fig. 36) and Watanabe et al. (1999, Fig. 69).

*Typification*. Davis (1948, p. 190), when choosing a lectotype of the name *B. chrysoglossa*, erred in selecting a specimen with the locality "Murray River" (MEL 1552393). That specimen, which lacks original labels but was apparently gathered by Mueller in 1853, consists of a sparingly glandular-pubescent, mostly glabrous, leafy branch. A duplicate is mounted on the same sheet and a further likely duplicate also exists (MEL 1517309). However, in his description Mueller noted that this "glandulously pubescent" perennial from the "Mallee scrub" had "leaves only on the lower part of the stem". This description clearly applies to a single plant gathered by Mueller in 1850 and not to the "River Murray" material. Furthermore, the 1850 collection (MEL 1552394) is also labelled in Mueller's hand, having the words "*Brachyscome chrysoglossa* Ferd. Mueller, radius luteus!, Murray scrub, Dr Ferd. Mueller". There is some discrepancy in the published locality information ("Mallee scrub") and that given on the label ("Murray scrub") but such inconsistencies are

common in Mueller's works and I believe this specimen is the holotype of the name *B. chrysoglossa*.

A specimen NY 00162718 viewed at the JSTOR website in August 2012 may well be of this species but has no details suggesting that it should be considered to have any type status; apart from the name it is only listed as coming from 'N. Australia', which in itself is somewhat erroneous.

**Notes.** The majority of specimens attributed by Davis (1948) to her *B. curvicarpa* are of *B. chrysoglossa*.

A polymorphic species, particularly in regard to fruit morphology. The wing-like margins of the fruit may be entire or variously lobed. Divided margins are most pronounced in Victorian collections and in some collections from the northern part of its range in Queensland and northern N.S.W. Some specimens, e.g. *E.J. McBarron 15754bis* from the Garah–Mungindi road, northern N.S.W., exhibit fruit with both entire and lobed margins. The degree of curvature of the fruit is also extremely variable, from almost flat to conspicuously curved, and there is some variation in the general indumentum in regard to the size and shape of the stalked glandular hairs, e.g. compare *J.R. Hosking 1902* and *P.S. Short 3155*, the latter having more robust hairs.

Leaf variation is frequently marked, even within a single plant, the larger basal leaves usually at least apically 3-lobed and the uppermost leaves usually entire. Rarely, for example as in *K.L. Wilson 1923*, the leaves may be up to c. 12-lobed and even have secondary lobes.

#### *Selected specimens examined.*

QUEENSLAND: 14 miles NE of Durdham Downs Station, 10 Aug. 1964, *L.G. Adams 1246* (BRI, CANB); 40 km N of Charleville, 14 Sept. 1987, *P.S. Short 3052* (BRI, MEL); 47 km S of Charleville, 16 Aug. 1989, *P.S. Short 3587* (AD, BRI, CANB, MEL, PERTH, TNS); 30 km E of Bollon, 30 Aug. 1978, *K.A. Williams 78238* (BRI); W of Oakley near Brookvale Park, 2 Oct. 1984, *K.A. Williams 84156* (BRI).

NEW SOUTH WALES: 0.5 km E of Belaringar Homestead, 24 Sept. 1975, *G.M. Cunningham & P.L. Milthorpe 4041* (NSW); Garah–Mungindi road, 19 Sept. 1968, *McBarron 15754bis* (NSW); Blue Hole, near Armidale, 15 April 1941, *C. Davis* (AD 97631369, BRI 330864, BRI 330865, MEL 239781); Gurley, 20 Sept. 1968, *E.J. McBarron 15828bis* (NSW, 2 sheets); Coocalla, 30 Sept. 1978, *K.L. Wilson 1923* (BRI, NSW).

VICTORIA: Massey Road, Lake Buloke West, 5 Oct. 1995, *P. Foreman M141* (MEL); NE corner of Kamarooka State Park, 13 Dec. 1986, *G. Hill* (MEL 1552605); Railway reserve at Pimpinio, June 1950, *E. Muir 513* (MEL); Barmah Forest, c. 8 km NW of Bearii, 22 Sept. 1980, *W. Stebbing & J. Stuwe JS 973* (MEL); 4 km NW of Bearii, 5 Nov. 1981, *W. Stebbing* (MEL 678304).

### 30. *Brachyscome curvicarpa* G.L.R.Davis

Proc. Linn. Soc. New South Wales 73: 192, Fig. 52, 61, pl. vi, map 19 (1948); G.M. Cunningham et al., Pl. W. New South Wales 650 (1981), p.p., excluding those with yellow ray corollas; Stanley in Stanley & E.M. Ross, Fl. SE Queensl. 2: 509, Fig. 71C (1986); J. Everett in G.J. Harden, Fl. New South Wales 3: 163 (1992), p.p., excluding

specimens with yellow rays, etc.; E. Salkin et al., Austral. Brachyscomes 80 (1995), excluding "*B. aff. curvicarpa*". — **Type citation:** "*Holotype:* Near Walgett, 'Coolabah savannah, dark grey self-mulching soil', 9.1942, N.C.W. Beadle (NSW)." **Holotype:** NSW 15382.

Annual herb, erect, 7–35 cm tall, much of the plant with a vestiture of stalked glandular hairs 0.2–1.0 mm long, the hairs almost straight to somewhat twisted, at least the largest with pale whitish-transparent stalks manifestly biseriate and septate. *Leaves* basal and cauline, 1–5 cm long, 0.2–1.3 cm wide, oblanceolate in outline, pinnatifid to pinnatipartite, with (3) 5–11 lobes, all leaves with a conspicuous vestiture of stalked glandular hairs 0.2–0.5 mm long. *Peduncles* with stalked glandular hairs, usually forming a dense indumentum immediately beneath the capitulum. *Involucre* 4.5–7.5 mm diam. *Bracts* 13–21 in c. 1 row, mainly obovate or elliptic, 3.1–5.0 mm long, 1.1–2.6 mm wide, mainly green but with scarious, often purplish margins, outer surface and margins usually with scattered, stalked glandular hairs. *Receptacle* convex to subconical, areolate, glabrous. *Ray florets* 20–40; corolla 6.4–9.7 mm long, 1.3–2 mm wide, 3-lobed, with 4 veins, expanded rays white or white with some mauve on undersurface, but drying yellow and yellow in bud. *Disc florets* 45–116; corolla 1.5–2.4 mm long, yellow. *Stamens* 5; anthers 1–1.45 mm long, microsporangia 0.83–1.14 mm long, apical appendages 0.16–0.32 mm long, filament collar more or less cylindrical and basally not thicker than the filament. *Style* 1.6–2.1 mm long, branches 0.75–0.95 mm long, sterile appendages triangular, slightly shorter than the stigmatic portion. *Cypselas* monomorphic, thin, strongly incurved, elliptic to widely elliptic or obovate to widely obovate, 1.9–2.5 mm long, 1.4–1.9 mm wide, dark brown-black; lateral surfaces of the fruit body with the central part manifestly tuberculate, each tubercle terminating in a white, apically-curved, eglandular hair, at least immature fruit with some glandular hairs; wing-like margins 0.1–0.2 mm wide, slightly inflated, edges entire and with apically-curved eglandular hairs; pericarp with 2 vascular bundles and a continual layer of sclerenchyma surrounding the testa (where it may be only 1-cell wide) and throughout all but the slightly inflated end of the wing; testa cells with u-shaped thickening (*P.S. Short 3554*); carpodium present, annular, white. *Pappus* bristles c. 10–15, white, 0.2–0.4 mm long. *Chromosome number:*  $n = 4$ . **Fig. 21, 10C, D.**

**Distribution.** Southern Queensland and New South Wales, being confined to the drainage basins of the Barwon and Darling Rivers.

**Habitat.** Commonly, if not always, on clay soil in areas subject to flooding. Frequently in open woodland communities dominated by Coolabah and Red Gum and with herb understories; also recorded for treeless flood plains dominated by grasses and chenopod shrubs.

*Phenology and reproductive biology.* Flowering has been recorded from May to November but it is most common in August and September.

Pollen:ovule ratios ranging from 1,812 to 3,420 were determined for 15 capitula from *P.S. Short 3554*.

Percentage pollen sterility examined in four populations of *B. curvicarpa* ranged from zero to 9% (Watanabe & Short 1992).

Salkin et al. (1995) recorded that germination of seed is markedly increased if seed is soaked overnight in water before sowing.

*Cytology.* Chromosome numbers of  $n = 4II$  and  $n = 4II + BI$  have been reported for this species by Watanabe & Short (1992) and Watanabe et al. (1996b), specimens sampled having come from the vicinity of Bourke, Louth, Walgett and Wilcannia in New South Wales. Idiograms of somatic metaphase chromosomes were presented by Watanabe et al. (1996a, Fig. 33) and Watanabe et al. (1999, Fig. 64).

Smith-White et al. (1970) also reported  $n = 4$  and  $2n = 8$  for this species but there are no voucher specimens for these determinations in SYD. As they distinguished a yellow-flowered form of *B. curvicarpa* (which I consider to be *B. chrysoglossa*) and as we know the distribution of typical *B. curvicarpa* I believe it reasonable to assume that the determinations from Bollon and Tilpa were for *B. curvicarpa* s.str., while Longreach material would have been of the vegetatively similar *B. tetrapterocarpha*. The distribution suggests that the population from Millmerran is likely to have been of *B. dentata*.

*Notes.* Davis cited 35 specimens under her description of *B. curvicarpa* and all but three of these have been examined. Of the 32 examined I refer 22 to *B. chrysoglossa*, six to *B. tetrapterocarpha*, and only four to *B. curvicarpa* s.str.

Morrow (1964) reported on the confusion of specimens of *B. tetrapterocarpha* and *B. curvicarpa* in BRI and all specimens referred in that paper to *B. tetrapterocarpha* are of that species. However, at least six of the eight specimens cited under *B. curvicarpa* are of *B. chrysoglossa*; *S.T. Blake 15876* is of *B. curvicarpa*. *Hartman 770* is a poor specimen; the illustration of the fruit accompanying the sheet suggests it may be *B. curvicarpa* but the single fruit in the packet seems malformed while the clear perennial nature and vesiture of the rest of the plant indicate that, if it belongs to the *B. dentata* group, then it is *B. chrysoglossa*.

Readily distinguished from *B. chrysoglossa* by the annual habit, white not yellow expanded ray florets, and the brown-black not yellow-brown mature fruit.

Vegetatively *B. curvicarpa* is close to *B. tetrapterocarpha* but the latter, as the name suggests, has 4-winged fruit, i.e. ab/adaxial wing-like margins and a central wing extending from each of the lateral surfaces.

#### *Selected specimens examined.*

QUEENSLAND: Bungunya, 27 July 1945, *S.T. Blake 15876* (BRI, MEL, PERTH).

NEW SOUTH WALES: 2.9 km NE of Barwon River bridge, Brewarrina, on road to Goodooga, 7 Sept. 1986, *R. Coveny 12295* & *J. Dalby* (BRI, NSW); 5 miles W of Louth, 7 Sept. 1971, *C.W.E. Moore 5870* (CANB, 2 sheets); 18 km from Bourke along main road to Cunnamulla, 15 Aug. 1989, *P.S. Short 3554* (MEL, NSW); 1.5 km SE of Wilcannia, 20 Aug. 1989, *P.S. Short 3633* (MEL, NSW, TNS); Iolanthe, 28 Sept. 1978, *K.L. Wilson 1915* (CANB, NSW).

#### 31. *Brachyscome debilis* Sond.

Linnaea 25: 477 (Apr. 1853); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 159, Fig. 13, 24, pl. vi, map 6 (1948); G.M.Cunningham et al., Pl. W. New South Wales 647 (1981); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1451, Fig. 655A (1986); J.Everett in G.J. Harden, Fl. New South Wales 3: 163 (1992); E.Salkin et al., Austral. Brachyscomes 84 (1995); P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 844, Fig. 170d (1999). — **Type citation:** "Kensington." **Lectotype (here designated):** Kensington, St Vincents Gulf, Nov. 1848, *F. Mueller* (MEL 220809 p.p., excluding specimen labelled as "Glennelg, St Vincents Gulf"). **Isolectotype:** ?K 000882212, see note below.

*Brachyscome leptocarpha* F. Muell., Defin. Austral. Pl. 10 (28 June–12 July 1855), preprint from Trans. Philos. Soc. Victoria 1: 43 (10 Sept. 1855), reprinted in Hooker's J. Bot. & Kew Gard. Misc. 8: 147 (1856), see Seberg (1986) for dates of publication; G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 157, Fig. 12, 23, pl. vi, map 5 (1948); G.M.Cunningham et al., Pl. W. New South Wales 647 (1981); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1454, Fig. 656C (1986); J.Everett in G.J. Harden, Fl. New South Wales 3: 161 (1992); E.Salkin et al., Austral. Brachyscomes 136 (1995). — **Type citation:** "In low grassland, not unfrequent [sic] in the colony of Victoria, as well as in South Australia." **Lectotype:** [Victoria], Axe River, Nov. 1853, *F. Mueller* (MEL 116043 p.p., excluding specimen from Melvor and isolectotypes). (Davis 1948, p. 157, Fig. 12). **Isolectotypes:** MEL 116043 p.p. **Unspecified S.A. and Vic. specimens which are presumed remaining syntypes:** South Australia, *F. Mueller* (K 000882215); [South Australia], Tanunda, *F. Mueller* (MEL 116036); [South Australia], Lofty Range, *F. Mueller* (MEL 116033, but contains both winged and unwinged fruit); [Victoria], Darebin Creek, Jan. 1853, *F. Mueller* (MEL 116045 p.p.); [Victoria], Melvor, *F. Mueller* (MEL 116043 p.p., NSW 15140); [Victoria], Loddon, *F. Mueller* (K 000882216, MEL 116044); [Victoria], Australia felix, ? *F. Mueller* (MEL 220808, ex herb. Sond.).

[*Brachyscome exilis* auct. non Sond.: Benth., Fl. Austral. 3: 516 (1867), excl. var. *scabrida*.]

Annual herb, branches ascending to erect, 2–25 cm long, green or purplish, glabrous or with scattered, long, septate eglandular hairs in the basal half and sometimes with shortly stalked glandular hairs. *Leaves* linear or oblanceolate in outline, 4–35 mm long, 0.3–11 mm wide, entire or pinnatisect, commonly tri-lobed, but with up to 9 lobes, each lobe weakly mucronate, all leaves with scattered, long, septate, whitish eglandular hairs. *Peduncles* 1–10 per plant and much longer

than the uppermost leaf on the same axis. *Involucre* 2.5–6.5 mm diam. *Bracts* 9–14, in c. 1 row and of about equal length, obovate, 2–3.6 mm long, 0.6–1.4 mm wide, with scarious margins, mostly glabrous but rarely with minute, glandular hairs on surface and margins. *Receptacle* convex to subconical, areolate, glabrous. *Ray florets* 8–69; corolla 4.1–7.4 mm long, white or mostly white but yellow at base of ray. *Disc florets* 10–69; corolla 1.4–2.3 mm long, apparently yellow when fresh but at least the lobes drying green. *Stamens* 5; anthers 0.79–1.3 mm long, microsporangia 0.58–1 mm long, apical appendages 0.21–0.3 mm long, filament collar about straight in outline and basally not thicker than filament. *Style* branches c. 0.6 mm long, sterile appendages triangular and c. the length of the stigmatic part. *Cypselas* dimorphic, either consistently winged or consistently unwinged in a plant, both types with 2 vascular bundles in the pericarp and an annular carpopodium. *Unwinged cypselas* flattish, oblanceolate or narrowly oblong, 1.7–2.45 mm long, 0.4–0.5 mm wide, uniformly brown; lateral surfaces smooth, with prominent, whitish, apically-curved, eglandular hairs; ab/adaxial margins glabrous; mature fruit reflexed on receptacle. *Winged cypselas* 1.7–2.2 mm long, 0.7–1.3 mm wide, thin; lateral surfaces glabrous or with several to many apically-curved, eglandular hairs; wing-like ab/adaxial margins not dissected to conspicuously dissected, with apically-curved hairs along their edges; mature fruit at least tending to reflex at maturity; testa cells with somewhat evenly-thickened walls (N.H. Scarlett 83/354). *Pappus* in all cypselas a white, jagged cup of 12–24 scale-like bristles, 0.3–0.8 mm long. *Chromosome number*:  $n = 3$ . **Fig. 2J, K.**

*Distribution.* South-eastern Australian mainland, south of c. 30° S and east of 137° E (South Australia, New South Wales, Victoria).

*Habitat.* Widespread in woodland, in habitats ranging from damp mossy hollows in rocks to shallow, rocky, well-drained soils.

*Phenology and reproductive biology.* Mostly recorded as flowering from September to January.

Pollen:ovule ratios were determined from two capitula of *P.S. Short* 3916. A value of 2,820 was calculated from a capitulum with 13 ray and 69 disc florets, while a value of 1,116 was determined from a capitulum with 8 rays and 10 disc florets, the latter being the smallest and last-formed capitulum on the plant.

Germination inhibitors may be present in this species, with Salkin et al. (1995) recording that germination may take as long as 90 days.

*Cytology.* Including published records for both *Brachyscome debilis* and *B. leptocarpa* chromosome numbers of  $n = 3$  or  $2n = 6$  have been determined throughout much of the range of the species, i.e. from Parachilna Gorge and Warrens Gorge in South Australia, from Mt Arapiles in Victoria and from Mt Arthur in New South

Wales (Smith-White et al. 1970, Fig. 7 & 16; Watanabe & Short 1992; Watanabe et al. 1996b). Smith-White et al. (1970, p. 109) noted that plants they referred to *B. leptocarpa* and which came from three localities remote from each other showed “some differences in chromosome morphology and in chromosome size.” An idiogram of somatic metaphase chromosomes was published by Watanabe et al. (1999, Fig. 71).

*Typification.* The lectotype specimen of the name *Brachyscome debilis* (MEL 220809 p.p.) chosen above is annotated by J.H. Willis as not being “examined by Sonder, but doubtless including part of the original collection from which the type diagnosis was made”. Willis gave no reason why he had reached this conclusion but it was presumably because it was not annotated as being a part of Sonder’s herbarium when specimens, originally forwarded by Mueller to Sonder for description, were returned to Australia and received at MEL in 1883 (Short 1990). It was presumably this note that resulted in Davis (1948, p. 160) recording that she could not locate “authentic syntype” material of *Brachyscome debilis* and choosing this specimen as a “haptotype”. As with Willis, I have no reason to doubt that this is part of Mueller’s original collection from Kensington; the apparent, but not definite, absence of other specimens also suggests that it was seen by Sonder. Thus, I have here chosen it as the lectotype specimen of the name *B. debilis*.

The specimen K 000882212, a Mueller collection labelled simply “St Vincents Gulf” is possibly an islectotype of *B. debilis* but may also be a duplicate of another specimen collected from Glenelg and mounted with the lectotype.

*Notes.* Smith-White et al. (1970) noted that the only consistent morphological difference between the two named species, *B. debilis* and *B. leptocarpa*, was the presence (*B. debilis*) or absence (*B. leptocarpa*) of wing-like margins on the cypselas. They suggested that such differences may have a simple genetic determination, a hypothesis supported by the fact that the two entities have similar distributions and are commonly found growing together. Thus, I (Short 1999) formally recognised *B. leptocarpa* as a taxonomic synonym of *B. debilis*, a treatment which is here maintained.

There is considerable variation in the degree of the development and dissection of the wing and winged fruit may also have glabrous or hairy lateral surfaces, features which vary within a single population. For example, *M. Kenny* (AD 98826236) contains just three plants, one with unwinged fruit, one with winged fruit with glabrous lateral surfaces and one with winged fruit with manifestly hairy lateral surfaces; *R. Melville* 1294 has winged fruits, which have lateral surfaces which are glabrous or conspicuously hairy within the one capitulum.

In the generic treatment of the genus for the *Flora of Victoria* I (Short 1999) referred this species to the

*Brachyscome debilis* group, with it being the only member. However, the thin fruit with eglandular, apically-curved hairs, the similar leaf morphologies and general habit shared with other species, and the observation that at least in some populations fresh ray corollas can be yellowish at the base, and dry yellow, are features suggesting it has strong affinities with other species in the *B. dentata* group. Such an affinity is even more apparent when the entity with winged fruits is used for comparison, wings being present in all other species. Furthermore, on morphological and chromosomal grounds the idea that *B. debilis* is derived within the group seems almost beyond doubt; all other members have a chromosome base number of 4, not  $n = 3$ , it is an annual herb (not perennial as are some other species), and it is the only one to have dimorphic (winged and unwinged), not monomorphic (winged only), fruit. However, this scenario is at variance with relationships indicated by the analyses of sequences of the Internal Transcribed Spacer regions reported by Field et al. (2006) where *B. debilis* (treated as *B. leptocarpa*) is not associated with other members of the *B. dentata* group but placed distinctly in another clade with *B. parvula* and *B. iberidifolia*.

#### Selected specimens examined.

SOUTH AUSTRALIA: Southern arm of Lake Bonney, 25 Oct. 1982, N.N. Donner 9651 (AD), fruit winged; Warraweena Station, 19 Sept. 1973, T.R.N. Lothian 5236 (AD), fruit unwinged; Wilpena Pound, 22 Sept. 1973, A.J.A. Sikkes 783 (AD), winged & unwinged fruit.

NEW SOUTH WALES: Zanci Station, 6 Nov. 1985, B. Rice 4254 (NSW), unwinged fruit.

VICTORIA: whipstick, near Kamarooka Forest, 7 Oct. 1962, W. Perry (MEL 530683), unwinged fruit; Cobaw Range, 15 Nov. 1983, N.H. Scarlett 83-355 (MEL), winged fruit; Mt Arapiles, Oct. 1969, H.M. Stace 5805 (SYD), winged & unwinged fruit.

### 32. *Brachyscome dentata* Gaudich.

in Frey., Voy. Uranie 468 (1830); N.T.Burb., Brunonia 5: 2 (1982); Stanley in Stanley & E.M.Ross, Fl. SE Queensl. 2: 510, Fig. 71E (1986); E.Salkin et al., Austral. Brachyscomes 88 (1995); P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 845, Fig. 170g (1999). — *Vittadinia dentata* (Gaudich.) DC., Prodr. 5: 281 (1836); N.T.Burb. Brunonia 5: 2 (1982). — **Type citation:** "In Novae Hollandiae ora orientali (Port-Jack.)." **Holotype:** Uranie/Port Jackson, undated, C. Gaudichaud (P 00731616, scan seen).

*Brachyscome heterodonta* DC., Prodr. 5: 305 (1836); J.H. Willis, Handb. Pl. Victoria 2: 675 (1973); Jessop, Fl. Centr. Austral. 370, Fig. 468G (1981); G.M.Cunningham et al., Pl. W. New South Wales 650, Fig. 641 (1981). — *Brachyscome heterodonta* var. *heterodonta*: D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1452, Fig. 656A (1986); J.Everett in G.J. Harden, Fl. New South Wales 3: 166 (1992). — **Type citation:** "in planis humidis Novae-Hollandiae interioris circa Bathurst et ad Lachlan river legit cl. A. Cunningham." **Lectotype:** swampy ground, Sidmouth Valley, near Bathurst, iv.1817, A. Cunningham (G-DC). (Davis 1948, p. 190). **Remaining syntype:** wet

plains on the Lachlan R., 10.v.1817, A. Cunningham (G-DC).

*Brachyscome marginata* Benth. in Endl. et al., Enum. Pl. Huegel 60 (Apr. 1837); Benth., Fl. Austral. 3: 519 (1867), p.p., excl. *B. chrysoglossa*; E.L. Robertson, J.M.Black's Fl. S. Austral., 856, Fig. 1152V (1965, rev. edn); — *Brachyscome marginata* var. *marginata*: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 186, Fig. 50, 59, pl. vi, map 18 (1948). — **Type citation:** "Ferd. Bauer." **Holotype:** "Insula van Diemen in graminosis ferd Bauer, del 75" (W). **Isotype:** "Australia, F. Bauer, Herb. Mus. Vind. F. Bauer. 1836" (K 000882304).

*Brachyscome calocarpa* F.Muell., Linnaea 25: 399 (April 1853); Benth., Fl. Austral. 3: 519 (1867); J.M.Black, Fl. S. Austral. 1st ed. 586, Fig. 245 L (1929). — **Type citation:** "In pascuis argillosis aridis prope Cudnaka." **Lectotype:** Cudnaka, Oct. 1851, F. Mueller (MEL 692659). (Davis 1948, p. 189). **Isolectotypes:** NSW 228999.

Perennial herb or sometimes perhaps a robust annual, erect, 15–45 cm tall, with a scattered to conspicuous indumentum of cottony, eglandular, septate hairs, usually at the base of the plant and immediately below the involucre, stalked glandular hairs usually absent or inconspicuous, sometimes dense. *Leaves* basal and cauline, 2–8 (10.5) cm long, 0.1–0.5 (2.8) cm wide, somewhat linear or oblanceolate, entire or often several lobes in upper section, often tri-lobed, glabrous or with scattered cottony hairs and sometimes shortly-stalked glandular hairs as found on the major axes. *Peduncles* usually with cottony hairs below involucre, glandular hairs absent or mostly inconspicuous. *Involucre* 5.4–10 mm diam. *Bracts* 13–30 in c. 1 row,  $\pm$  equal, mainly obovate, elliptic or narrowly elliptic, 2.6–5.3 mm long, 1–2.5 mm wide, mainly green but with scarious, often purplish margins, outer surface glabrous or with scattered, eglandular, cottony hairs and shortly stalked glandular hairs. *Receptacle* convex to subconical, areolate, glabrous. *Ray florets* 33–71; corolla 6.4–11.8 mm long, 1.1–2.2 mm wide, 3-lobed, with 4 veins, maturing white, often or always yellow in bud. *Disc florets* 85–289, 5-lobed. *Stamens* 5; anthers 1.1–1.62; microsporangia 0.88–1.29; apical appendages 0.33–0.39 mm long. *Style* 1.7–2.52 mm long; arms 0.81–1.13 mm long; appendages triangular, about the length of the stigmatic part. *Cypselas*, thin, flat, very widely obovate to obovate, 2.3–4.6 mm long, 1.6–2.8 mm wide, light brown; lateral surfaces with up to c. 30 (very rarely several) short but conspicuous tubercles which may terminate in an apically-curved eglandular hair; wing-like margins usually variously dissected into a number of distinct teeth and with apically-curved hairs, sometimes margins entire or almost so; pericarp with 2 vascular bundles; testa cells with somewhat evenly thickened walls (*P.S. Short* 1311,  $n = 4$ ); carpodium present, annular. *Pappus* of c. 15–20, brownish or white bristles 0.5–1.2 mm long, connate at base. *Chromosome number:*  $n = 4, 8, 12$ . **Fig. 2L.**

*Distribution.* South Australia, Queensland, New South Wales, Australian Capital Territory and Victoria.

**Habitat.** Occurs in a diversity of habitats; e.g. in southern Victoria in basalt-derived soil in grasslands dominated by species of *Themeda* and *Danthonia*; in sandy loam in mallee-eucalypt communities in north-western Victoria; and on heavy clay soil in Yellow Gum associations near Dimboola in western Victoria.

**Phenology and reproductive biology.** Mostly recorded as flowering from August to December but occasionally also in other months.

Estimates of pollen sterility ranging from zero to 77% has been observed in this species but high estimates of pollen sterility were rare and florets displaying no pollen infertility were always found in the populations examined. This is consistent with the observation that plants, including tetraploids and hexaploids which commonly form a single quadrivalent, show reasonably regular male meiosis (Watanabe & Short 1992).

Due to apparent pollen sterility a pollen:ovule ratio of just 805 was estimated for one individual capitulum from *P.S. Short* 3626. However, within the same population, estimates of pollen:ovule ratios obtained from individuals with no apparent pollen sterility ranged from 1,799 to 3,669, figures in keeping with species which commonly cross-pollinate. Indeed, it has been found that cultivated, tetraploid plants failed to set seed when isolated in a glasshouse (Watanabe & Short 1992), indicating obligatory outcrossing. In contrast, Davis (cited in Smith-White et al. 1970) recorded that in the Armidale district *B. dentata* is, or may be, facultatively apomictic.

Salkin et al. (1995) reported that seed readily falls from capitula and germinates moderately well in 7–60 days.

**Cytology.** A polyploid species with  $n = 4, 8$  &  $12$  and with up to four B chromosomes recorded in some specimens (Smith-White et al. 1970, as *Brachyscome marginata* but excluding the count of  $n = 9$ ; Watanabe & Short 1992; Watanabe et al. 1996b). Idiograms of somatic metaphase chromosomes were also presented by Watanabe et al. (1996a, Fig. 34) and Watanabe et al. (1999, Fig. 65).

With the exception of specimens from Bourke, Warrumbungles N.P. and Eucharina there are apparently no other vouchers in SYD of specimens referred by Smith-White et al. (1970, as *B. marginata*) to this species.

Two specimens, *Smith-White & Carter* 4802 and 4803, held at SYD and collected from Chambers Gorge (Flinders Ranges, S.A.) are clearly labelled as having  $n = 4$  and  $2n = 8$ , but these determinations were not reported in Smith-White et al. 1970.

**Typification.** The holotype specimen of *B. marginata* in W is labelled as having been collected by Bauer from Tasmania, i.e. from “Insula van Diemen”. This is clearly a case of mislabelling. Bauer never visited Tasmania (e.g. Mabberley 1999, Vallance et al. 2001) and it is unknown from that State. In the original

description Bentham (1837) did not cite a locality and in his (Bentham 1867) subsequent account of the species only recorded it for Queensland and New South Wales. The isotype specimen in K is simply labelled as coming from Australia.

I have viewed a scan of the type specimen of *Brachyscome dentata* and follow Burbidge (1982) in the application of the name.

A specimen P 00742959 viewed at the JSTOR website in August 2012 appears to be of *B. dentata*. However, it is not (as indicated) a type specimen of the name *Brachyscome calocarpa*, being collected by C. French from Dimboola.

**Notes.** I have excluded var. *chrysoglossa* – recognising it as *B. chrysoglossa* – but have otherwise generally maintained Davis’s (1948) concept of this species, not because I believe it is one biological entity, but because more work is required to document and assess the importance of the morphological and cytological variation that exists within it. Morphologically there is considerable variation in leaf size and shape, general vestiture – including the size of the stalked glandular hairs, and in fruit morphology, particularly in the size, shape and number of tubercles on the lateral surfaces of the fruit and in the size and degree of dissection of the wing-like margins. It also occupies a wide range of habitats – from temperate to arid climes – and as noted exhibits different ploidy levels and, at least in the New England region, may be facultatively apomictic.

The species is usually readily distinguished from *B. chrysoglossa* in having white, not yellow, ray corollas at maturity. In *B. chrysoglossa* the cypselas lack tubercles on the lateral surfaces and their wing-like margins are commonly entire, only being toothed in some populations, whereas both tubercles on the lateral surfaces and toothed margins are usually prominent features of specimens of *B. dentata*. Plants of *B. chrysoglossa* are usually almost glabrous or have an indumentum of stalked glandular-hairs; unlike *B. dentata* specimens they commonly lack cottony hairs or, if cottony hairs are present, they are generally scattered or confined to leaf axils and absent from the base of capitula.

Using the above features I have rarely been troubled in distinguishing *B. chrysoglossa* from *B. dentata*, despite the polymorphism exhibited in both taxa, but there are specimens for which the colour of ray corollas is not recorded and which have characters which suggest that the demarcation between the two variable species needs further critical examination. It should be noted that I have no doubt that *B. dentata* s.str. and *B. chrysoglossa* s.str. are distinct species, but in the broad sense the high degree of variability means that the boundary between the two can be somewhat blurred. As an example of a problem with identification, see some specimens from New England such as *R.W. Jessup* & *M. Gray* (CANB 93303 & CANB 93305, from the vicinity of Yarrawyck and Inverell respectively) for



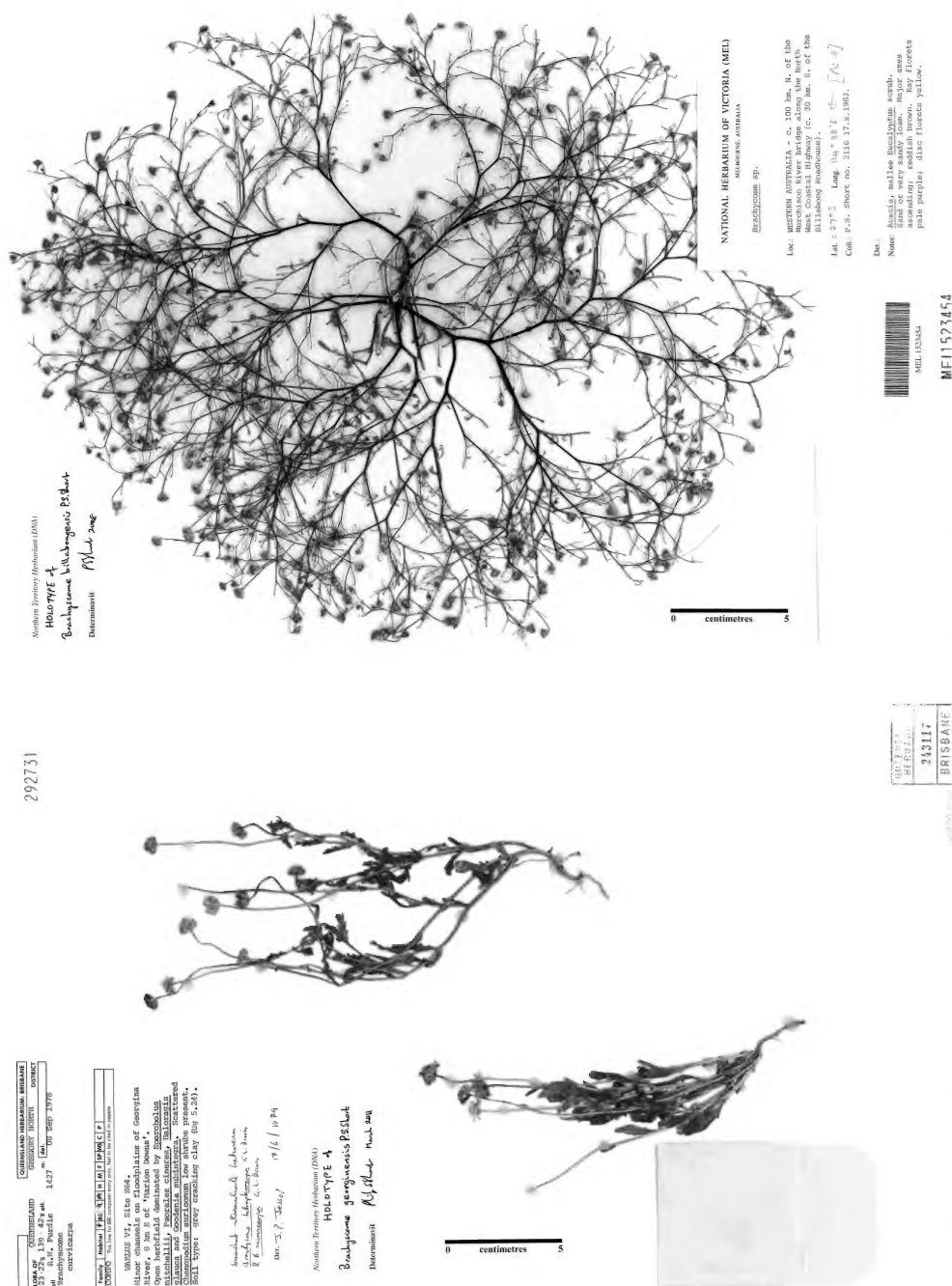


Fig. 27. Holotype of *Brachyscome georginensis* (BR), R.W. Purdie 1427.

Fig. 28. Holotype of *Brachyscome billabongensis* (MEL), P.S. Short 2116.



which the colour of the ray corollas was not recorded but the densely glandular-hairy vestiture immediately suggested that they belong to *B. chrysoglossa*. Both specimens also lack cottony, eglandular hairs at the base of capitula and lack distinct tubercles on the surfaces of the cypselas. However, the size and shape of the leaves are essentially typical of *B. dentata* in that region, not *B. chrysoglossa*, suggesting placement in *B. dentata*. These specimens may well represent a further taxon deserving of formal recognition.

Measurements and data pertaining to floral characteristics are mainly based on three collections, each of a different ploidy level: *P.S. Short* 3755 ( $n = 4$ ), *P.S. Short* 3650 ( $n = 8$ ) and *P.S. Short* 3626 ( $n = 12$ ).

#### *Selected specimens examined.*

**SOUTH AUSTRALIA:** Chowilla, 5 Oct. 1988, *J.H. Browne* 181 (AD); 14 miles N of Wirrealpa, 25 Aug. 1968, *D.E. Symon* 6096 (AD, B.n.v., CANB, K, NSW).

**QUEENSLAND:** between Allora and Clifton, 21 Nov. 1946, *S.L. Everist & L.J. Webb* 1247 (BRI, CANB); 35 km S of Cunnamulla, 17 Aug. 1988, *P.S. Short* 3163 (BRI, MEL); Ranges Bridge, Condamine River, W of Dalby, 2 Oct. 1984, *K.A. Williams* 84158 (BRI).

**NEW SOUTH WALES:** 37 km NW of Menindee, 30 Aug. 1981, *M.G. Corrick* 7331 (AD, CANB, MEL, NSW); Nangara Stn, 22 Oct. 1981, *L. Haegi* 2064 (MEL, NSW); 1 km N of Ando, 9 Jan. 1989, *R.M. King* 9784 (G, MEL); 10 km N of Bourke, 15 Sept. 1987, *P.S. Short* 3073 (MEL).

**AUSTRALIAN CAPITAL TERRITORY:** Canberra, 22 Oct. 1949, *E. Gauba* (CBG 12109).

**VICTORIA:** Calder Hwy, 114 miles E of Melbourne, 5 Oct. 1952, *R. Melville* 1457 (K, MEL, NSW); c. 6 km SE of Patchewollock, 30 Sept. 1981, *P.S. Short* 1311 (AD, MEL); Melton South, 5 Nov. 1991, *V. Stajsic* 408 (MEL).

### 33. *Brachyscome georginensis* P.S.Short, *sp. nov.*

**Type:** minor channels on floodplains of Georgina River, 8 km E of "Marion Downs", 23°22'S, 139°42'E., 8 Sept. 1978, *R.W. Purdie* 1427 (**holotype:** BRI 243117).

Annual *herb*, erect, to c. 20 cm tall, much of the plant with a vestiture of stalked glandular hairs 0.1–0.4 mm long. *Leaves* basal and cauline, 0.5–4.5 cm long, 0.15–0.6 cm wide, oblanceolate in outline, entire or pinnatifid, with 3–9 lobes, all leaves with a scattered to moderately dense vestiture of stalked glandular hairs 0.05–0.3 mm long. *Peduncles* with obviously stalked and sessile glandular hairs which usually form a dense indumentum immediately beneath the capitulum. *Involucre* c. 6–8 mm diam. *Bracts* c. 15 in essentially 1 row, obovate to oblanceolate, 3.4–4 mm long, 1–1.9 mm wide, centrally green, margins scarious, outer surface and margins glabrous or with scattered, glandular hairs. *Receptacle* subconical, areolate, glabrous. *Ray florets* c. 15–20; corolla to c. 6.5–10 mm long, 1.2–1.5 mm wide, with 2–4 veins, expanded rays seemingly white. *Disc florets* c. 30–50; corolla 2–2.5 mm long, yellow. *Stamens* 5; anthers 1.25–1.65 mm long, microsporangia 0.95–1.25 mm long, apical appendages 0.29–0.33 mm long, filament collar more or less straight in outline and

basally not or perhaps slightly wider than the filament. *Style* c. 2.5 mm long, branches c. 0.9 mm long, sterile appendages triangular and much shorter than the stigmatic portion. *Cypselas* monomorphic, thin, strongly incurved, widely elliptic, 2.2–2.4 mm long, 1.7–2.1 mm wide, yellow-brown; lateral surfaces of the fruit body smooth, glabrous; wing-like margins 0.1–0.2 mm wide, the edges entire or virtually so and with apically-curved eglandular hairs; pericarp with 2 vascular bundles; carpodium present, annular, whitish brown. *Pappus* bristles c. 10, white, 0.1–0.15 mm long. **Fig. 3A, 27.**

**Distribution.** The only specimen, the type, was collected on floodplains of the Georgina River in south-western Queensland, the name of the river providing the specific epithet.

**Habitat.** The type specimen was collected from an open herbfield on grey cracking clay, the herbfield having scattered shrubs of *Chenopodium auricomum* but dominated by *Sporobolus mitchellii*, *Cullen cinereum*, *Haloragis glauca* and *Goodenia fascicularis*.

**Phenology and reproductive biology.** The type specimen was collected in September 1978.

A pollen:ovule ratio for the species was not determined as this would have meant destruction of a capitulum. However, 6,058 pollen grains were counted from a single disc floret, a figure suggesting a high level of cross-pollination.

**Cytology.** No data recorded.

**Notes.** This species is similar to *B. curvicarpa* and *B. tetrapterocarpa* in having strongly curved cypselas. It differs from *B. curvicarpa* by the cypselas which are yellow-brown (not brown-black) and not tuberculate, and in the stalked glandular hairs of the stems and leaves being up to 0.4 mm long, not to c. 1 mm long. It differs from *B. tetrapterocarpa* in having cypselas which are yellow-brown (not brown to brown-black), have entire margins (never lobed), and lack wings on the lateral surfaces.

### 34. *Brachyscome papillosa* G.L.R.Davis

Proc. Linn. Soc. New South Wales 73: 191, Fig. 51, 60, pl. vi, map 19 (1948); G.M.Cunningham et al., Pl. W. New South Wales 650, Fig. 64m (1981); J.Everett in G.J.Harden, Fl. New South Wales 3: 167 (1992); E.Salkin et al., Austral. Brachyscomes 172 (1995). — **Type citation:** "Holotype: Near Mossgiel, N.S.W., 'saltbush plain, grey clay loam', 8.1942, N.C.W. Beadle (NSW)."  
**Holotype:** NSW 15352.

Annual *herb*, 10–40 cm tall, with a general vestiture of stalked, glandular hairs and cottony hairs. *Leaves* basal and cauline, linear or linear-oblanceolate, 8–70 mm long, 1–11 mm wide, entire or with 3–7 (19) lobes, often dilating somewhat at the base, mostly appearing green but usually with stalked, glandular hairs and cottony, eglandular hairs with bases several cells wide. *Peduncles* with stalked glandular hairs and white, cottony, eglandular hairs without wide bases, all hairs

commonly forming a dense indumentum immediately beneath the capitulum. *Involucre* c. 5–10 mm diam. *Bracts* c. 15–20, in essentially 1 row, obovate to oblanceolate or elliptic to narrowly elliptic, 3–5 mm long, 0.8–1.8 mm wide, mainly green but with scarious, often apically purplish margins, the outer herbaceous surface with a scattered to dense indumentum of stalked, glandular hairs 0.1–0.2 (–0.4) mm long. *Receptacle* convex to subconical, areolate, glabrous. *Ray florets* c. 18–43; corolla 6.5–10 mm long, 0.7–1.8 mm wide, with (4) 5 veins, expanded rays white or perhaps somewhat mauve at least underneath but drying yellow. *Disc florets* c. 30–80 or more; corolla 1.9–2.2 mm long, yellow or sometimes greenish. *Stamens* 5; anthers c. 1.2 mm long, microsporangia c. 0.95–1 mm long, apical appendages c. 0.3 mm long, filament collar almost straight in outline and basally not thicker than the filament. *Style* c. 1.9–2 mm long, branches c. 0.8 mm long, sterile appendages triangular and much shorter than the stigmatic portion. *Cypselas* monomorphic, thin, oblate to widely elliptic or widely obovate, 2.2–3.2 mm long, 1.85–3.2 mm wide, the fruit body mostly pale brown but densely covered with longitudinal rows of prominent, flat, whitish, scale-like tubercles, each tubercle often with an eglandular hair at the apex, apically the fruit body with or without a few stalked, glandular hairs; wing-like extensions very pale brown or whitish, 0.5–1 mm wide, the surface flat to undulate, the margins entire or lobed and with or without scattered, eglandular, apically curved hairs; pericarp with 2 vascular bundles; testa cells with somewhat evenly-thickened walls (*W.T. Parsons 1949*); carpodium present, annular, whitish and often somewhat obscure. *Pappus* bristles c. 15, white, 0.3–0.5 mm long, shorter than to slightly exceeding the apical notch of the fruit. *Chromosome number*:  $n = 4$ . **Fig. 3B, 10E.**

*Distribution.* New South Wales endemic, found in the south-west of the State on floodplains of minor and major waterways, including the Lachlan and Murrumbidgee rivers.

*Habitat.* Grows in clay soils in seasonally flooded areas; associated dominants include *Eucalyptus largiflorens*, *Chenopodium nitrariaceum* and species of *Atriplex* such as *A. vesicaria*.

*Phenology and reproductive biology.* Flowering herbarium specimens have been collected from early June to late March, but peak flowering is probably from about mid-August to late October.

A pollen:ovule ratio of 3,394 was obtained from a capitulum of *K. Watanabe 215*; it had 27 ray and 80 disc florets.

Salkin et al. (1995) recorded that seed germinates moderately well after 10–50 days.

*Cytology.* Smith-White et al. (1970, Fig. 51, 63, 64) and Watanabe et al. (1996b) recorded  $n = 4$  for this species, with 1 or 2Bs sometimes present. Smith-White et al. (1970) also recorded  $n = 5$  for this species but



**Fig. 29.** *Brachyscome tetrapterocarpha*, near Eromanga, Qld. — *P.S. Short 3609*.

their Fig. 64 is here taken to show 4 bivalents and a large B chromosome. Idiograms of somatic metaphase chromosomes were also presented by Watanabe et al. (1996a, Fig. 35) and Watanabe et al. (1999, Fig. 66).

*Notes.* Davis (1948) and Cunningham et al. (1981) stated that in this species the ray corolla is mauve. However, it is apparent from notes accompanying specimens that rays are white, or usually so, when fresh. It is also evident from specimens that the ray corolla become yellow on drying.

#### *Selected specimens examined.*

NEW SOUTH WALES: near Jerilderie on Finley road, 22 Sept. 1961, *M.E. Phillips* (CBG 020372); 26 miles W of Hay, 31 Aug. 1962, *M.E. Phillips* (CBG 025643); Gampang Station, Lake Leaghur, 27 Sept. 1985, *B. Rice 4165* (NSW); Willanthery, 26 Aug. 1973, *P.L. Milthorpe & G.M. Cunningham 1413* (NSW); 300 m S of bridge over Merrimajee Creek on Mossiel road, 23 Oct. 1993, *K. Watanabe 215* et al. (MEL, NSW, TI).

#### **35. *Brachyscome tetrapterocarpha* G.L.R.Davis**

Muelleria 1: 111, Fig. 1–3 (1959); E.Salkin et al., Austral. Brachyscomes 236 (1995). — **Type citation:** “*Holotype*: 15 miles south-east of Muttaborra on Aramac-road, Queensland, open grassy downs, in small water channel. 9.9.1956, *N.T. Burbidge* (CANB. No. 5523). *Paratypes*: Same collection (MEL; NSW; BRI; ADW).” **Holotype:** CANB 39303 (sheet no.). **Isotypes:** AD 98403197 (ex ADW), CANB 79294, CANB 79295, MEL 220531, NSW 229594.

Annual herb, erect, 8–35 cm tall, much of the plant with a vestiture of stalked glandular hairs 0.3–0.8 mm long and often making the stems slightly viscid, at least the pale whitish-transparent stalks of the largest hairs distinctly biserial-septate. *Leaves* basal and cauline, 1–7.5 cm long, 0.4–1.3 cm wide, mostly oblanceolate in outline and pinnatifid to pinnatifid, with 3–11 lobes, the first-formed and sometimes the uppermost leaves entire, all leaves with a conspicuous vestiture of stalked glandular hairs 0.15–0.7 mm long. *Peduncles* with stalked glandular hairs usually forming a dense indumentum immediately beneath the capitulum. *Invo-*

*lucre* 6–9.5 mm diam. *Bracts* 13–22 in essentially 1 row, mainly obovate to oblanceolate or elliptic, 3.8–5.6 mm long, 1.3–2.9 mm wide, mainly green but with scarious, often purplish margins, the outer surface and margins usually with scattered, stalked glandular hairs. *Receptacle* convex to subconical, areolate, glabrous. *Ray florets* 20–35; corolla 6.1–11.3 mm long, 1.3–2.5 mm wide, 3-lobed, with 4 veins, expanded rays white or mauve, but drying yellow and immature rays apparently also yellow. *Disc florets* 62–166; corolla 1.7–2.8 mm long, yellow. *Stamens* 5; anthers 1.15–1.65 mm long, microsporangia 0.85–1.3 mm long, apical appendages 0.2–0.4 mm long, filament collar more or less straight in outline and basally not thicker than the filament. *Style* 1.8–2.5 mm long, branches 0.8–1.2 mm long, sterile appendages triangular, slightly shorter than the stigmatic portion. *Cypselas* monomorphic, thin, strongly incurved, elliptic to widely elliptic, 2.2–3.1 mm long, 1.5–2.5 mm wide, brown to dark brown-black; lateral surfaces of the fruit body glabrous but with a central longitudinal wing developed on each face; central wings entire or the margins shallowly dividing into somewhat flat to tubercle-like lobes, the lobes in 1 or more or less 2 rows and terminating in white, apically-curved, eglandular hairs; ab/adaxial wing-like margins c. 0.2 mm wide, slightly inflated, their margins entire or slightly lobed and with apically-curved eglandular hairs; pericarp with 2 vascular bundles and with a continual layer of sclerenchyma surrounding the testa; testa cells with u-shaped thickening (P.S. Short 3152); carpodium present, annular, white. *Pappus* bristles c. 15, white, 0.1–0.2 mm long. *Chromosome number*:  $n = 4$ . **Fig. 3C, 29.**

**Distribution.** Only known from the linked drainage basins of the Thompson River, Barcoo River and Coopers Creek in Queensland.

**Habitat.** Recorded as growing in clay, silty clay, and sandy loam in herbfields and grasslands with scattered shrubs, e.g. *Astrelba* grassland with *Acacia nilotica*, and possibly restricted to floodplains.

**Phenology and reproductive biology.** Flowering and fruiting has been recorded from June to October, the number of herbarium specimens suggesting that July–August is the peak time for flowering.

Estimated pollen:ovule ratios determined for 20 capitula of *P.S. Short 3609* and *P.S. Short 3611* ranged from 1,920 to 6,384. The range is large and this reflects variation in the percentage pollen sterility, which ranged from zero to 49% (Watanabe & Short 1992).

Salkin et al. (1995) recorded that seed is quickly shed and that about 20% germination occurred in 15–25 days.

**Cytology.** Chromosome number of  $n = 4 + 0$  or 1B and  $2n = 8$  were recorded from two populations in the vicinity of Eromanga by Watanabe & Short (1992, Fig. 1E). An idiogram of somatic metaphase chromosomes

has been published in Watanabe et al. (1996a, Fig. 32) and Watanabe et al. (1999, Fig. 63).

Distributional data suggests that a determination by Smith-White et al. (1970, Fig. 61, as *B. curvica*) of  $n = 4$  and  $2n = 8$  for an unvouchered specimen from the vicinity of Longreach applies to this species.

**Typification.** There are discrepancies between the current distribution of isotype specimens of *B. tetrapterocarpa* and published records. Davis (1959) originally recorded four “paratype” (i.e. isotype) collections as being allocated for ADW, BRI, MEL and NSW. Subsequently (Anonymous 1967) it was reported that the “paratype” of *B. tetrapterocarpa* destined for the herbarium of Waite Agricultural Research Institute (ADW) had been destroyed by fire at Armidale but specimens for MEL and NSW had been distributed prior to the fire. The only isotypes seen by me are, as indicated above, housed in AD (ex ADW), CANB, MEL and NSW.

Neither of the two CANB sheets listed as isotypes appear to have been seen by Davis; annotations on the sheets by Max Gray are perhaps ambiguous on this point but neither sheet is annotated by her. Davis’s practice to select a single element as a holotype and the lack of reference in the protologue to further material in CANB also indicates this to be the case.

**Notes.** *Brachyscome tetrapterocarpa* is readily distinguished from *B. chrysoglossa* by the annual habit, white, not yellow, expanded ray corollas, and the 4-winged fruit.

Vegetatively close to *B. curvica*, *B. tetrapterocarpa* differs in the mid-line of each of the lateral surfaces lacking tubercles and extending instead into a thin wing, resulting in the 4-winged nature of the fruit to which the epithet refers.

The collection *S.T. Blake 10015* is stated on the label to have “yellow flowers”. The only ray flowers observed on that specimen are immature, suggesting that rays are initially yellow but turn white or mauve when fully expanded, as is the case in *B. curvica*.

#### *Selected specimens examined:*

QUEENSLAND: 20 km S of Aramac, 4 Sept. 1985, *E.R. Anderson 4054* (BRI); 116.8 km SW of Noccundra, 13 July 1971, *D. Boyland 3081* (BRI); Kingsborough Lane, about 24 miles N of Aramac, 4 June 1949, *S.L. Everist 3838* (BRI, CANB); 30 km E of Eromanga, 18 Aug. 1989, *P.S. Short 3609* (BRI, MEL, TNS); 30 km SW of Eromanga, 18 Aug. 1989, *P.S. Short 3611* (BRI, MEL, TNS).

#### *Brachyscome iberidifolia* group

*Brachyscome iberidifolia* group: P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 849 (1999).

**Herbs**, annual, many species with a zig-zag branching pattern. **Leaves** simple to 2-pinnate, lobes often linear; apex of main leaf or terminal leaflet dilated in some species. **Terminal anther appendages** absent. **Style arms** with appendages triangular to narrowly triangular or somewhat oblong. **Cypselas** monomorphic or somewhat

dimorphic, ovoid, club-shaped or wedge-shaped, with or without broad ab/adaxial margins and often swelling at the apex; lateral surfaces often somewhat concave, the entire cypselas often minutely papillate or tessellated; eglandular biseriate hairs straight to curved, their apices straight to variably curling; pericarp lacking large secretory canals; carpodium usually present, possibly absent and at least poorly developed in several taxa. *Pappus* absent or present. *Chromosome number*:  $x = 9$ .

*Notes.* *Brachyscome billabongensis*, *B. gilesii* and *B. simulans* are included here because of vegetative similarity to many members of the *B. iberidifolia* complex and lack of a terminal anther appendage. However, the somewhat wedge-shaped cypselas with a cover of straight hairs and the near-oblong style arms makes them a distinctive group. The shape of the style arms suggest a relationship with *Roebuckia* although the absence of secretory canals in the pericarp suggests otherwise.

### 36. *Brachyscome bellidioides* Steetz

in Lehm., Pl. Preiss. 1: 426 (14–16 Aug. 1845) (“*Brachyscome*”); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 215, Fig. 89, 100, pl. vi, map 27 (1948) (“*Brachyscome*”); Grieve & Blackall, How Know W. Austral. Wildfl. 803 (1975) (“*Brachyscome*”); N.S.Lander in Marchant et al., Fl. Perth Region 663 (1987) (“*Brachyscome*”); E.Salkin et al., Austral. Brachyscomes 52 (1995). — **Type citation**: “In arenosis illustribus sylvae supra oppidulum Perth, d. 1. Sept. 1839. Herb. Preiss. No. 99.” **Lectotype**: New Holland, Swan River Colony, in clayey borders of woods above the town of Perth, J.A.L. Preiss 99 (MEL 2035101, ex herb. Steetz). (Davis 1948, p. 215). **Isolectotypes**: G 00222788, K 000882335 (ex TCD, an anomalously numbered (McGillivray 1975) substandard specimen labelled as *Preiss* 290), LD 1056132 (per JSTOR), S 07-7462.

*Herb.* annual, glabrous, unbranched or, if branching, mainly doing so from the base, c. 5–18 cm tall. *Leaves* mostly basal or near-basal, linear or linear-oblongate or linear-elliptic, c. 4–30 mm long, c. 0.8–2.2 mm wide, occasionally with 1 or 2 short teeth or lobes in the upper ¼. *Involucral bracts* c. 15, thinly herbaceous, with hyaline margins and apices, apices barely acute to obtuse, margins often purplish. *Ray florets* c. 15; corolla 5–18 mm long, 0.8–3 mm wide, white. *Disc florets* with corolla tube yellow, 5-lobed; lobes yellow or greenish. *Cypselas* c. 1–1.4 mm long, 0.45–0.6 mm wide, compressed, with a manifestly grey-tessellated surface, the tessellations square or oblong in outline, the surface also with minute papillae but eglandular hairs absent; pericarp with 2 vascular bundles, secretory canals absent; carpodium present. *Pappus* absent or perhaps barely developed. *Chromosome number*:  $n = 9$ . **Fig. 3D.**

*Distribution.* South-western Western Australia, from about Jurien Bay in the north to King Georges Sound on the south coast, with most collections from coastal or near-coastal areas.

*Habitat.* Commonly recorded as growing in heathland on sand. Collectors’ notes also make reference to

it growing “in grey-brown loam, limestone” (*G.J. Keighery* 5268) and in “open Tuart woodland” (*N.S. Lander* 1015).

*Cytology.* Turner (1970), erroneously using the name *B. ciliocarpa*, published a chromosome number determination of  $n = 9$  for *B.L. Turner* 5445, a specimen which, by virtue of the apparent lack of hairs on the surface of the immature cypselas, is referable to this species.

*Typification.* Davis (1948) correctly noted that a sheet at MEL contains undoubted syntype specimens of the name *B. bellidioides*, these forming part of Steetz’s original herbarium, and from which she selected a lectotype and recorded the presence of five lectoparatypes. There can be no doubt that she was referring to the collection J.A.L. Preiss 99, which is now numbered as MEL 2035101; it is the only sheet of J.A.L. Preiss 99 housed at MEL and annotated with data cited by Steetz and Davis. However, there are eight distinct plants on the sheet, three of which have each lost their individual capitulum, not a total of six plants as indicated by Davis’s number of lectoparatypes. Florets from one or perhaps two capitula are housed in an attached envelope and it may be that she only considered plants which, at the time of her examination, held a capitulum as constituting available syntypes. However, more importantly, Davis failed to annotate this sheet in any way. Her normal practice was to clearly annotate, in blue ink, an individual element as her chosen lectotype specimen and also label individual remaining syntypes as lectoparatypes. Very often she also illustrated her chosen lectotype but, in this case, Fig. 89 is labelled as a lectoparatype, i.e. an isolectotype. As she failed to either annotate or illustrate the lectotype specimen, and as I have no reason to believe that *Preiss* 99 is anything but representative of a single taxon, I simply regard all elements on the sheet as constituting the lectotype specimen of the name *B. bellidioides*.

Note that the type specimen mostly lacks completely mature cypselas. However, immature fruit in the fragment packet lack hairs and a near-mature fruit visible in a capitulum on the second plant from the left is greyish and distinctly tessellated, leaving no doubt that the name *B. bellidioides* applies to the taxon briefly described above.

*Notes.* The most distinctive feature of this annual herb pertains to the morphology of the flattened, epappose cypselas which lack apical swellings and have a manifestly grey-tessellated surface.

Vegetatively similar to some specimens which, because of their cypselas morphology, are referable to *B. pusilla*.

#### *Selected specimens examined.*

WESTERN AUSTRALIA: King Georges Sound, Oct. 1905, Goadby (PERTH 393290); Subiaco, 1902, A.G. Hamilton (NSW 15515); c. 2 km S of Seabird, 27 Oct. 1993, B.J. Keighery & N. Gibson 29 (PERTH); 8 km E of Jurien Bay, 12 Sept. 1978, N.S. Lander 1024 (PERTH); Fremantle, A. Oldfield (MEL 220569).

**37. *Brachyscome billabongensis* P.S.Short, sp. nov.**

**Type:** Western Australia. c. 100 km N of Murchison River Bridge, (c. 30 km S of Billabong Roadhouse), 27°S, 114°38'E, *Acacia*, mallee *Eucalyptus* scrub, 17 Oct. 1983, *P.S. Short 2116* (**holotype:** MEL 1523454; **isotype:** PERTH 393312).

Annual *herb*; major axes ascending to erect, 5–20 cm long, often manifestly flexuose, greenish to dark reddish-brown, small plants non-branching, but otherwise branching at basal, near basal and upper nodes, each axis terminating in a capitulum, with mostly sparsely distributed, stalked glandular hairs less than c. 0.04 mm long, eglandular hairs absent. *Leaves* basal and cauline, alternate; basal and near basal leaves seemingly readily lost and the entire leaves or their lobes to c. 2 mm wide; in mature plants leaves linear and entire (and sometimes only entire in small plants), c. 5–15 mm long, c. 0.3 mm wide, with variably inrolled margins or 1-pinnatisect, each margin with 1–5 linear-subcylindrical lobes c. 3–15 mm long, c. 0.2 mm wide, very occasionally with additional secondary lobes, apices of entire leaves and lobes blunt or innocuously mucronate and often dilated and spoon-like, glabrous or with scattered stalked glandular hairs as on stem and branches. *Involucre* c. 1.7–4 mm diam. *Bracts* c. 8–14, in 1 row, of about equal length, overlapping, obovate to oblanceolate or elliptic to narrowly elliptic, 2.6–3.5 mm long, 0.9–1.5 mm wide, sterome narrow, herbaceous and slightly cartilaginous, with a conspicuous externally indented midvein, with wide hyaline entire margins and apices, outer surface glabrous or with scattered, very shortly stalked glandular hairs as on leaves. *Receptacle* hemispherical, pitted, glabrous. *Ray florets* c. 8–10. *Ray corolla* 7–8 mm long, 2.2–3.4 mm wide, mauve or pale purple; veins 4 or 5; apex obtuse and not lobed. *Disc florets* c. 11–22, corolla 1.2–1.6 mm long, 5-lobed, yellow, externally with conspicuous biseriate, septate, tapering hairs 0.08–0.24 mm long, seemingly with a minute apical gland. *Stamens* 5; anthers with microsporangia 0.64–0.7 mm long, apical appendages absent; filament collar 0.24–0.28 mm long, straight in outline and basally not thicker than the filament. *Style* 2.5–2.75 mm long; arms 0.9–1.15 mm long; appendages oblong, 0.7–0.8 mm long, yellow or greenish; stigmatic surface 0.2–0.34 mm long. *Cypselas* monomorphic, somewhat flattened, in outline manifestly tapering from the apex to the base and in outline somewhat obtriangular to cuneate, c. 1.2–1.55 mm long, 0.5–0.6 mm wide, straight or slightly longitudinally curved; ab/adaxial margins evident but not manifestly distinct, smooth; entire fruit mostly dark purple-brown but the acute base, the thickened obtuse apex and, to some extent, the ribs yellow-brown; eglandular hairs covering the fruit except for the bare apex, straight, 0.08–0.24 mm long, apically minutely and evenly or slightly unevenly bifid (but bifid apex not or barely evident under  $\times 50$  magnification); pericarp with 2 vascular bundles, large secretory canals absent; carpodium

probably developed but very narrow. *Pappus* absent. *Chromosome number:*  $n = 9$ . **Fig. 28.**

**Distribution.** Western Australia, only known to me from an area between the Murchison River in the south and Towrana Station (c. 25°S) in the north, with all localities within c. 150 km of the coast.

**Habitat.** In *Acacia* and eucalypt-dominated scrub on sand or sandy loam.

**Phenology and reproductive biology.** Flowering specimens have been collected in April, August and October.

A pollen:ovule ratio of 1,921 was determined for a capitulum of *P.S. Short 4100*. It had 8 ray and 22 disc florets and no pollen sterility was observed.

**Cytology.** A haploid chromosome number determination of  $n = 9$  was reported by Watanabe et al. (1996b; *P.S. Short 4100*, under *B. iberidifolia* Benth. complex).

**Etymology.** The name reflects the fact that I first became aware of this species after collecting it in the vicinity of the Billabong Roadhouse along the North West Coastal Highway.

**Notes.** *Brachyscome billabongensis* differs from most species of *Brachyscome* by having cypselas mostly covered in straight, biseriate, eglandular hairs, as also found in *B. gilesii* and *B. simulans*. It differs from *B. simulans* in lacking a pappus and from *B. gilesii* in having a sparse indumentum of stalked glandular hairs less than c. 0.04 mm long (not a few hairs which are c. 0.06–1 mm long).

**Additional specimens examined.**

WESTERN AUSTRALIA: 2 km NE of Towrana Station, 30 Apr. 1982, *R.J. Cranfield 2185* (PERTH); between Murchison River & Shark Bay, Oct. 1877, *F. Mueller* (MEL 1562775); Shark Bay, Oct. 1877, *F. Mueller* (MEL 692821); c. 30 km S of Billabong Roadhouse, 19 Aug. 1977, *P.S. Short 398* (AD); 29 km N of Galena Bridge along NW Coastal Hwy, 8 Oct. 1993, *P.S. Short 4100* (AD, CANB, MEL, PERTH, TI).

**38. *Brachyscome exilis* Sond.**

Linnaea 25: 473 (1853); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 217, Fig. 91, 102, pl. vi, map 28, pl. 13 (1948) ("*Brachycome*"); E.L.Robertson, J.M. Black's Fl. S. Austral., 854, Fig. 1152O (1965, rev. edn) ("*Brachycome*"); J.H.Willis, Handb. Pl. Victoria 2: 671 (1973) ("*Brachycome*"), p.p.; D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1452, Fig. 655E (1986) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 108 (1995); P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 849 (1999). — **Type citation:** "Fiedler's Section. Novemb. Dr. Behr. Kensington. Port Lincoln. In *caumine montis Barker*." **Lectotype:** Fiedler's Section, Adelaide, Behr (GH, ex herb. Sond., n.v.). (Davis 1948, pp. 217 & 218). **Remaining syntypes:** Mount Barker, 29 Sept. 1848, *F. Mueller* (MEL 692573) (seen by Benth, see notes below); Port Lincoln, Anon. (MEL 692572); Kensington, November 1848, *F. Mueller* (MEL 116031, p.p. excluding most elements, see note below).

*Brachyscome exilis* var. *scabrida* Sond., Linnaea 25: 473 (April 1853) ("*Brachycome*"); Benth., Fl. Austral. 3: 516

(1867). — **Type citation:** “ß. in deserto trans fl. Murray.”

**Original Lectotype:** “across R. Murray, ‘desert’, D. Schulzen (?), 1848 (lectotype ... MEL).” (Davis 1948, p. 217). **New Lectotype (here designated):** In deserto trans fl. Murray, ?1848, Schulzen (MEL 692635 p.p., the lectotype being the lower right element and associated fragments, see note below). **Possible remaining syntype:** (MEL 692635 p.p., upper left specimen, see note below).

*Brachyscome neglecta* J.M.Black, Trans. & Proc. Roy. Soc. South Australia 52: 228 (1928) (“*Brachyscome*”); J.M.Black, Fl. S. Austral. 585 (1929) (“*Brachyscome*”). — **Type citation:** “Southern districts; Murray lands; Yorke and Eyre Peninsulas to Fowler’s Bay; Kangaroo Island; South-East.” **Lectotype:** Strathalbyn, in scrub, 25 Sept. 1909, J.M. Black (AD 98421076 p.p., ex herb. J.M. Black). (Davis 1948, p. 217 & 218). **Isolectotype:** MEL 692571 p.p. **Remaining syntypes:** Strathalbyn, 2 Oct. 1906, Anon. (?J.M. Black) (AD 98421076 p.p., ex herb. J.M. Black); Murray Bridge to Callington, 5 Oct. 1906, Anon. (?J.M. Black) (AD 98421076 p.p., ex herb. J.M. Black); Kinchana, Oct. 1926, J.B. Cleland (AD 98421076 p.p., ex herb. J.M. Black); Kinchana, nr Monarto South, 12 Oct. 1926, J.B. Cleland (AD 98421076 p.p., ex herb. J.M. Black); East Wellington, Anon., herb. R. Tate (AD 98421076 p.p., ex herb. J.M. Black), several fruit & bracts only, seemingly *B. exilis*; Middle River, Kangaroo Island, Oct. 1908, H.H.D. Griffith (AD 98421077 p.p., ex herb. J.M. Black); probably Patawalonga River, 1882, Anon., herb. R. Tate (AD 98421077 p.p., ex herb. J.M. Black); probably from Patawalonga Creek, 1883, Anon., herb. R. Tate (AD 98421077 p.p., ex herb. J.M. Black); scrub near east Wellington, Anon. (?J.M. Black) (AD 98421077 p.p., ex herb. J.M. Black). **Probable remaining syntypes:** near Wellington, Anon. (K 000882333, MEL 692571 p.p.). *Brachyscome glabra* F.Muell. in Sond., Linnaea 25: 473 (1853) (“*Brachyscome*”), nom. inval., cited in synonymy as “F.Muell. in sched. non Benth.”.

Annual herb with the major axes ascending to erect, 4–27 cm long, glabrous or with stalked glandular hairs less than 0.1 mm long, these usually well below the base of the capitula but sometimes present immediately beneath it and on the involucre; long-septate hairs usually absent but sometimes present in the leaf axils. *Leaves* basal and cauline, alternate, some leaves (very rarely all) entire and somewhat linear or linear-oblongate, most leaves obovate to narrowly obovate in outline, c. 5–30 (50) mm long, c. 3–20 mm wide, variously lobed, being shallowly toothed to mostly pinnatisect, with oblong to linear lobes, each leaf usually with 2–10 primary teeth or lobes and major secondary lobing absent or mostly so except in cultivated specimens, basally leaves not dilated to manifestly subamplexicaul, all leaves glabrous or with scattered, stalked glandular hairs. *Involucre* 4–8 mm diam. *Bracts* c. 10–15 in c. 1 row, of about equal or somewhat unequal length, ovate, obovate or elliptic, 1.9–3.5 mm long, 0.5–2.2 mm wide, mainly green but with scarious, often purplish, glandular-hairy margins, outer surface glabrous or with scattered, shortly stalked glandular hairs. *Receptacle* flat or slightly convex, areolate, glabrous; at maturation the bracts slightly enfolding the outer cypselas. *Ray florets* female, c. 18–



Fig. 30. *Brachyscome exilis*, Daly Heads, S.A. — P.S. Short 3908.

42; corolla c. 3.5–7.6 mm long, 1.1–1.8 mm wide, white or rarely shades of blue or pink, veins (3) 4 or 5. *Disc florets* bisexual, c. 15–72, corolla tube c. 1.3–2.2 mm long, yellow, 5-lobed, lobes with a cluster of short hairs apically on their inner surfaces. *Stamens* 5, 0.65–1.08 mm long, apical appendages absent. *Style* c. 1.74–2.3 mm long; style arms c. 0.74–1.17 mm long, appendages somewhat narrowly triangular and c. 2–4 times the length of the stigmatic part. *Cypselas* in lateral view somewhat obovate to oblanceolate in outline, c. 1.3–1.9 mm long, 0.4–0.6 mm wide, straight, the broad ab/adaxial margins usually swelling at the apex (sometimes swelling more pronounced in fruit of the ray florets than disc florets), lateral surfaces somewhat concave, cypselas entirely brown or grey-brown (the colour often varying within a capitulum), minutely papillate; eglandular hairs always present, particularly at the apex of the cypselas, sometimes all hairs on a cypselas apically-curved and (c. 0.05) 0.15–0.3 mm long, in others apically-curved hairs few or absent from a single cypselas and the hairs straight and apically obtuse to variably curving (particularly towards their apex), all hairs c. 0.04–0.1 (0.14) mm long; pericarp with 2 vascular bundles; testa cells with u-shaped thickening (P.S. Short 3908); carpodium present and well-developed. *Pappus* absent. *Chromosome number:*  $n = 9$ . **Fig. 3E–G, 30.**

**Distribution.** Southern South Australia, south-western Queensland, New South Wales and north-western Victoria.

**Habitat.** Found in a range of habitats, e.g. with saltbush on saline gypseous soils, in sandy soils on the margins of saline lakes, in mallee-eucalypt communities, in *Casuarina*-dominated woodland and on exposed cliffs and limestone ridges in coastal regions.

**Phenology and reproductive biology.** Flowering mostly occurs from about August to December.

Pollen:ovule ratios ranging from 1,381 to 2,411 were determined from five capitula in a population (P.S. Short 3908) at Daly Head, Yorke Peninsula. This population is representative of the “coastal form” discussed below.

Pollen number determinations were also obtained from *P.S. Short 3733*, a specimen composed of plants with comparatively long, apically-curved hairs on the cypselas and pinnatisect leaves with oblong or linear leaves. Not all plants exhibited sterility but in 13 of the 15 florets examined, each from a separate plant, 4–66% of the grains were considered to be sterile. Pollen:ovule ratios of 3,072 and 3,492 were obtained from the two capitula with apparently fully fertile pollen.

Salkin et al. (1995) indicated that seed germinates moderately well after 10–50 days.

**Cytology.** Chromosome numbers of  $n = 9$  and  $2n = 18$  have been recorded for this species by Carter (1978a) and Watanabe & Short (1992). In the latter reference this includes *P.S. Short 3908*, which was referred to *B. exilis*, plus *P.S. Short 3733*, a specimen then simply referred to the *B. iberialifolia* complex.

**Typification notes for *B. exilis*.** I have not seen the lectotype specimen, but Davis (1948, p. 218) indicated that Behr's specimen from Fiedler's Section (near Tanunda) is in "both vegetative features and details of the fruit" conspecific with a syntype specimen from Mt Barker (MEL 692573), a specimen which I have examined. This collection consists of three small plants – only the middle of which has most of its leaves – and a fragment bag containing fruit. Cypselas in the fragment bag have scattered eglandular hairs about their apices and surfaces, the largest hairs mostly about the apex and the longest of which are c. 0.08–0.12 mm long and minutely apically-curved; the shortest hairs on the body of the fruit may be as little as c. 0.05 mm long but still appear to be apically-curved. Hairs on mature fruit on the plant on the right-hand side are as described for those in the bag. In contrast, the mature capitulum on the plant on the left-hand side has capitula in which the longest hairs are c. 0.08 mm long and curved while the majority of hairs on the body of the fruit are c. 0.04–0.06 mm long and almost straight. The middle plant has immature capitula but the lower leaves are deeply divided, with the lobes somewhat oblong.

The specimen MEL 116031 consists of three small plants and an envelope containing fruit. There are three labels accompanying the specimen. One is Mueller's original collection slip which indicates that he gathered it at Kensington in November 1848. Another, perhaps in Sonder's hand, records the same place and date of collection, and has the name "*B. exilis* Sonder!". Both labels are initialled with the letter "B", indicating that they were seen by Benth. As Kensington is listed in the protologue and the specimen is also annotated as *B. exilis* it seems that it must be an original syntype specimen, but, as noted on a third label, undated and perhaps in the hand of J.H. Willis, "The three small plants mounted herein are ... not *B. exilis*, as truly represented by the types from Mt. Barker and Port Lincoln." Indeed, all three plants are of *B. debilis*. Only the envelope contains several fruit and florets which are

of *B. exilis*: one immature floret has apically-curved hairs at the apex of the fruit, two seemingly mature fruit have a few short but apically-curved hairs at the apex, and both an immature fruit and a mature fruit lack apically-curved hairs but have short, straight blunt hairs on their bodies. The variation exhibited by the fruits in the envelope suggest to me that they have come from more than one specimen, including perhaps the lectotype specimen of var. *scabrida*. As specimens from the Sonder herbarium, and indeed the earlier MEL collections in general, were once unmounted it is unsurprising that mistakes are sometimes made with curation. It is all too easy to imagine labels, fruit and other fragmentary matter, as well as small plants, becoming mixed in common species folders enclosing multiple collections. In this particular case I suspect that the placement of plants of *B. debilis* on this sheet may well reflect the fact that, as with *B. exilis*, Mueller collected the type specimen of *B. debilis* from Kensington in November 1848. Note that the specimens of *B. debilis* on this sheet have unwinged cypselas, unlike the lectotype specimen with winged cypselas. As such, it is not an isolectotype of the name *B. debilis*.

**Typification notes for *B. exilis* var. *scabrida*.** Davis (1948, p. 218), in her notes accompanying her description of *B. exilis*, recorded that

The var. *scabrida* described by Sonder was founded on a specimen collected by Dr Schulzen, 'in desert, on other side of Murray River', a haptotype of which has been nominated.

However, in her list of specimens examined she recorded "across R. Murray, 'desert'. D. Schulzen (?), 1848 (lectotype, *B. exilis* var. *scabrida* Benth., MEL)" and thus it is here accepted that she chose the lectotype. The specimen is not annotated by Davis but given the labelling there is no doubt that the specimen she examined is on the sheet now numbered as MEL 692635. It consists of two main elements. The element on the upper left side consists of seemingly the majority of a mature plant and is accompanied by a fragment bag which, as it is initialled with the letter "B", the contents must be considered to have been seen by Benth. as *Flora Australiensis*. The element on the lower right side consists of a large branch with mature capitula which, at first glance looks as if it was once attached to the upper element. However, the relative size of the two elements and, most importantly, different hair types on the intact fruit, indicates that this is not the case. This second element is also accompanied by a fragment bag which clearly indicates that the fruit within it are part of that same element. Furthermore, there is an annotation on the sheet by J.H. Willis. Dated 1 August 1943, it records that the lower right element was

taken from the sheet labelled '*B. exilis* - Kensington - Nov. 1848', where it was doubtless placed in error among typical examples of *B. exilis* from Kensington, and served to mislead Benth. when he recorded var. *scabrida* from this location.

I think it reasonable to assume that, as the specimen was



annotated in 1943 and that she published her revision in 1948, Davis examined both elements of this specimen as now mounted on MEL 692635. However, she did refer to the nominated haptotype specimen as being “considerably larger in all vegetative features than the type material of *B. exilis*” (Davis 1948, p. 218), indicating that she may have been referring to the lower element. Indeed, this would be in keeping with her normal practice of selecting a single element on a sheet as a lectotype. However, this is pure conjecture and when recording the Schulzen specimens as the lectotype under “Specimens examined” she gave no indication that this was the case. It is, however, necessary to select a definite, and therefore new lectotype specimen of the name *B. exilis* var. *scabrida* Sond. as I believe that the two elements may represent two entities. The upper left element retains fruit which only have short curled or barely incurving hairs and these are predominantly at the apex, while in the lower right element the hairs are short, blunt and almost straight on both the apex and lateral surfaces of the fruit. Both specimens have somewhat glandular pubescent branches as mentioned in the original description, but only the lower right specimen is in keeping with the description in having “achaeniis tetragonis muriculato-scabridis”. I therefore consider the lower right specimen and the material definitely associated with it in the fragment bag as the new lectotype specimen of var. *scabrida*. I also believe that, thanks to the mix up of labels and specimens already referred to, the mature fruit with short blunt hairs which are contained in the fragment bag and seen by Bentham but now associated with the upper left specimen should be considered to be part of the lectotype specimen. With their unclear curatorial history and hair differences in intact fruit I only consider the element on the top left of the sheet to be a possible remaining syntype and certainly not an islectotype of the name var. *scabrida*.

*Typification notes for B. neglecta.* The syntype specimens of this name cited by Black include the coastal form (see “Notes”) and specimens matching var. *scabrida*. However, the lectotype and islectotype specimens from Strathalbyn have apically-curved hairs on the apex of the cypsela and such scattered hairs, perhaps sometimes better described as curving rather than apically-curved, are found elsewhere on the body but appear to be lost at maturity; they appear to be representative of *B. exilis* s.str.

Black (1929), under his description of *B. neglecta*, cited “*B. muelleri*, Tate non Sond.”, suggesting that Ralph Tate formally coined a later homonym which is a synonym for *B. exilis*. I have found no evidence that this is the case and assume that Black was referring to Tate’s (1889) list of new additions of plants to the Port Lincoln district in which *B. muelleri* was recorded from “Bushy places near Fountain” (Tate 1889, p. 83). *Brachyscome muelleri* does not occur in the Port Lincoln district but *B. exilis* is common and, although I have not seen the aforementioned specimen in either Tate’s or Black’s

herbaria in AD, it appears that Black was only making reference to a misidentification by Tate.

*Notes.* In this treatment the circumscription of this species is essentially that as previously presented by Black (1929, as *B. neglecta*), Davis (1948), Cooke (1986) and myself (Short 1999). I maintain it here but to anyone comparing, for example, coastal populations from southern Eyre Peninsula with specimens from New South Wales, this treatment will be seen to be inadequate. I have no doubt that several segregate taxa should be recognised. However, I have rarely seen populations in the field and without more detailed examination have refrained from formally recognising the entities upon which I now expound.

Strictly applied, the name *B. exilis* appears referable to some specimens found in the central distribution of the species. These include *A.G. Spooner* 7837 from Cooke Plain, *A.G. Spooner* 8830 from Elwomble Scrub, and *R. Bates* 29167 from Lyndoch, all of which have mostly short (c. 0.12–0.18 mm long) apically inrolled hairs on their cypselas. The specimen *R. Bates* 29167 was gathered not far from the locality of the lectotype specimen (Fiedler’s Section, near Tanunda) and, considering the illustrations published in Davis (1948), appears to be a particularly good match with the lectotype. With Davis’s choice of lectotype (from Strathalbyn), the name *B. neglecta* J.M. Black also appears to apply to this same entity.

Specimens from south-western Queensland, New South Wales, Victoria and parts of South Australia (including the southern Flinders Ranges and margins of lakes south of the Gawler Ranges) commonly have basal and near basal leaves which are pinnatisect and have oblong or linear lobes and cypselas which only have apically-curved hairs to c. 0.3 mm long. Examples include *N.T. Burbidge & M. Gray* 4663 and *P.S. Short* 3733 from South Australia, *M.D. Crisp* 1486, *J.H. Leigh* S32 and *M.E. Phillips* 623 from New South Wales, *A.C. Beaulehole* 39376 and *J.H. Browne* 372 from Victoria, and apparently a specimen from Queensland (*E. Salkin*, MEL 696897). The last specimen, the only one seen by me from Queensland, represents a major disjunction in distribution, and is also unusual in having pink rather than the usual white ray corollas, although the above Burbidge & Gray specimen collected between Hesso and Port Augusta was recorded as having purple rays. I have little doubt that all of these specimens are specifically distinct from *B. exilis* s.str.; they are also unlikely to be representative of a single taxon.

The basal leaves of specimens from coastal and near coastal regions of South Australia are not pinnatisect, but are narrowly obovate in outline and are either entire or have several short teeth or shallow lobes, the mid to upper cauline leaves are commonly ovate in outline, and approaching subamplexicaul, while the cypselas have hairs which are less than c. 0.15 mm in length (and often considerably smaller) and may be straight and apically blunt to curled and, very rarely, they may be



very slightly apically-curved. Representative specimens include *D. Hopton* 133, *G. Jackson* 994, *P.S. Short* 3908, *T.J. Smith* 2314, *D.E. Symon* 9586A and *S.A. White* (AD 97733323). It may reflect the fact that they are cultivated, but specimens (*D.E. Symon* 6844) grown from seed collected from Dorothee Island (Pearson Islands) have much larger leaves and the largest basal and/or near basal leaves are secondarily divided, the primary lobes being toothed.

Specimens from the south-eastern region of South Australia approach the above coastal form but cypselas seem to only have apically blunt, straight, eglandular hairs which are c. 0.04–0.1 mm long. As with the coastal form, leaves may be shortly toothed and the upper ones somewhat subamplexicaul, but many leaves may be entire and, indeed, only so in *D. Hunt* 2617. Other specimens of this entity include *R. Bates* 7861 and *D.E. Symon* 10472. Uncertainty as to its distinctiveness from the coastal form has meant that I have not reinstated the variety but I believe such specimens are referable to var. *scabrida* Sond., s.str.

#### *Selected specimens examined.*

**SOUTH AUSTRALIA:** Lyndoch scrub, 5 Oct. 1992, *R. Bates* 29167 (AD); Lake George, 7 Nov. 1986, *R. Bates* 7861 (AD); Hesso to Port Augusta, 11 Oct. 1955, *N.T. Burbidge & M. Gray* 4663 (AD, CANB); Lincoln N.P., near coast on road to Memory Cove, 22 Oct. 1988, *D. Hopton* 133 (AD); Kangaroo Island, Stanleys Beach, *G. Jackson* 994 (AD); c. 27 km S of Hiltaba, 30 Aug. 1989, *P.S. Short* 3733 (AD, CANB, PERTH, TNS); Daly Heads, 10 Oct. 1990, *P.S. Short* 3908 (AD, BRI, CANB, CHR, DNA, E, HO, NSM, RSA, S, TI); coastal cliffs at Point Souttar, 3 Oct. 1968, *T.J. Smith* 2314 (AD); Cooke Plains, 23 Aug. 1981, *A.G. Spooner* 7837 (AD); Elwomble Scrub, 18 Aug. 1983, *A.G. Spooner* 8830 (AD); Warunda, 9 Oct. 1909, *S.A. White* (AD 97733323); Yorke Peninsula, "Ethel" wreck beach, 7 Oct. 1974, *D.E. Symon* 9586A (AD); Coorong, 37.5 km S of Salt Creek, 10 Oct. 1975, *D.E. Symon* 10472 (AD).

**QUEENSLAND:** near Thargomindah, 20 Aug. 1989, *E. Salkin* (MEL 696897).

**NEW SOUTH WALES:** Cocopara Range, 25 km ENE of Griffith, 13 Nov. 1975, *M.D. Crisp* 1486 (CBG); 50 miles NE of Hay, 26 Sept. 1963, *J.H. Leigh* S32 (NSW); Mt Hope Trig Stn, 30 Aug. 1961, *M.E. Phillips* 623 (CBG).

**VICTORIA:** Hattah Lakes N.P., 10 Sept. 1960, *A.C. Beauglehole* 39376 (MEL); Raak Plain, 6 Sept. 1986, *J.H. Browne* 372 (MEL).

### 39. *Brachyscome eyrensis* G.L.R.Davis

Proc. Linn. Soc. New South Wales 79: 207, Fig. 18–20 (1955) ("*Brachycome*"); Grieve & Blackall, How Know W. Austral. Wildfl. 803 (1975) ("*Brachycome*"). — **Type citation:** "*Holotype:* Figure-of-Eight Island, Recherche Archipelago, Western Australia, 7.11.1950, J.H. Willis (MEL). *Paratypes:* Three. *Loc. cit.* (MEL.)." **Holotype:** Figure-of-Eight Island, Recherche Archipelago, Western Australia, on damp sand under large granite boulders at the low central neck, often wet with salt spray, 7 Nov. 1950, J.H. Willis (MEL 220534 p.p., excluding isotypes). **Isotypes:** K 000882313, MEL 220534 (p.p., excluding holotype and including both the "paratypes" and "undesignated paratypes" of Davis), NSW 230545.

Annual *herb* with the major axes ascending to erect, c. 4–17 cm long, often with minor upper branching, plants commonly mostly glabrous but young growth and often the mid-region of plants with stalked glandular hairs less than c. 0.5–0.1 mm long, sometimes dense, particularly on young shoots; long-septate cottony hairs absent or few. *Leaves* basal and cauline, alternate, glabrous or with occasional stalked glandular hairs as on branches, only dense on some young shoots; basal and near-basal leaves the longest on the plants, oblanceolate to linear-oblanceolate in outline and c. 9–20 (30) mm long, c. 2.4–5.5 (7) mm wide, sometimes entire but usually each margin with 1–3 lateral teeth in the upper  $\frac{1}{3}$ – $\frac{1}{2}$ ; cauline leaves generally decreasing in size towards the capitula, lower ones tending to be oblanceolate in outline, each margin with 1 or 2 teeth; mid-cauline and many upper leaves oblanceolate to obovate, elliptic or ovate to widely ovate, c. 2.5–17 mm long, 1.5–4.5 (7) mm wide, each margin with 1–3 teeth or short lobes, the lowest teeth often towards the base of the leaf, basally not to manifestly dilated and sometimes subamplexicaul; uppermost leaves elliptic, ovate or somewhat oblong, c. 1.5–2 mm long, commonly entire; teeth in all leaves apically acute. *Involucre* c. 2.2–3.5 mm diam. *Bracts* c. 8–11 in c. 1 row, of about equal length, obovate or oblong (but apically rounded), 1.7–2.2 mm long, 0.65–1.1 mm wide, mainly green and thinly herbaceous, with very narrow hyaline margins and apices, apically obtuse, upper margins with stalked glandular hairs c. 0.5 mm long and often purplish, outer surface glabrous or with scattered, shortly stalked glandular hairs; at maturation of the fruit the bracts slightly enfolding the outer cypsel. *Receptacle* flat or slightly convex, glabrous. *Ray florets* female, c. 15–31; corolla c. 1.5–2.4 mm long, 0.32–0.49 mm wide, apically minutely 2-lobed, white, pink or pale blue, veins 3 (4). *Disc florets* bisexual, c. 7–19, corolla tube c. 0.8–1.2 mm long, yellow, 4- or 5-lobed, lobes with a cluster of short hairs apically on their inner surfaces. *Stamens* (?) 5, 0.35–0.51 mm long, apical appendages absent; filament collar straight, c. 0.2 mm long. *Style* c. 1.2 mm long; style arms c. 0.42–0.5 mm long, appendages somewhat longer than stigmatic part. *Cypselas* mono- or dimorphic, those of the ray florets flat or with apical swellings on the lateral side and thick ab/adaxial margins which may almost obscure the lateral surfaces, those of the disc florets always flat and with narrow ab/adaxial margins and lacking apical swellings; in lateral view all cypselas obovate to oblanceolate in outline, 1–1.6 mm long, 0.3–0.5 mm wide, straight or almost so, lateral surfaces mostly dark grey, grey-black or purplish-brown but with numerous and minute white papillae, ab/adaxial margins yellowish or similar to the ground colour of the lateral surfaces, eglandular hairs 0.04–0.14 mm long, straight to curving and apically blunt to variably curled, hair types often mixed on a single cypsel. but may only be curled; pericarp with 2 vascular bundles; testa cells with u-shaped thickening

(*P.S. Short 3901*); carpopodium distinct, yellowish. *Pappus* absent. *Chromosome number*:  $n = 9$ .

**Distribution.** South-western Western Australia, with somewhat disjunct populations in the north on Escape Island (Jurien Bay) and near Cervantes and the remaining known populations found in an area which extends from about the Stirling Ranges north-east to Lake Cronin and east to the Recherche Archipelago and Israelite Bay.

**Habitat.** A somewhat salt-tolerant herb found on the margins of salt lakes among samphires and in often exposed coastal sites. Recorded as growing in "saline clay", "sand or silty sand" and in "sand and guano".

**Phenology and reproductive biology.** Flowering and fruiting mainly occurs from September to November, but a specimen with near-mature fruit has been gathered in June from Observatory Island, while plants with mature fruit have also been collected in December.

Pollen:ovule ratios were determined from five capitula collected from a population at Thomas River (*P.S. Short 3901*). Values ranged from 197 to 353; female florets outnumbered bisexual florets in all capitula.

**Cytology.** Under the name *B. exilis*, chromosome numbers of  $n = 9$  and  $2n = 18$  were recorded for this species by Watanabe et al. (1996b). An idiogram of somatic metaphase chromosomes from the same population – at Mullett Lake Nature Reserve, W.A. (Watanabe 178) – was also published by Watanabe et al. (1999, Fig. 42) under the same name.

**Typification.** On the sheet MEL 220534 containing type material of *B. eyrensis* there is material mounted on a separate card and attached to the main sheet. The label at the base of the card in J.H. Willis's hand indicates that the material constitutes the "TYPES examined by Mrs Davis, 1954)—HOLO + 3 PARATYPES". Above this is a label giving details of the collection in Willis's hand and, above this, the mounted elements. Again in Willis's hand, one element is labelled as the holotype, the others as paratypes. That they are not labelled in Davis's hand is unusual but, as there was considerable correspondence between Jim Willis and Gwenda Davis in regard to the taxonomy of the genus, including the recognition of this species, I am assuming that the specimen designated as the holotype is consistent with Davis's wishes. Intriguingly, the illustration in Davis's publication of the name does not match the element on the sheet which is designated as the holotype. This is unusual as illustrations in her other publications of new species are frequently based on the holotype specimen, and labelled as such. However, in this case there is no indication in Davis's publication that this was the case. I have therefore simply accepted Willis's indication as to which element should be regarded as the holotype specimen of the name *B. eyrensis*.

Other elements of this specimen which were not seen by Davis are mounted elsewhere on this sheet and are

labelled as "Undesignated paratypes" in Willis's hand and are considered here to be isotypes.

**Notes.** Within Western Australia *B. eyrensis* is vegetatively distinct from other members of the *B. ibericifolia* group by virtue of the upper subamplexicaul and often toothed leaves. This feature is shared with many specimens referred to the eastern Australian *B. exilis* s.lat. but members of that complex do not have the very short ray florets, small anthers and low pollen levels of *B. eyrensis*.

In the type specimen, and the only other specimen I have seen from the Recherche Archipelago, both the ray and disc cypselas are flattened, a feature, which in combination with the presence of slightly curled apices (never straight) on the eglandular hairs of the cypselas, distinguish these populations from most mainland specimens in which the cypselas of the ray florets have swollen apices ("shoulders") and the eglandular hairs are straight and apically blunt or barely curling at the apex. However, at least in *A.E. Orchard 1441* (AD duplicate) – collected from north of the coast at Stokes Inlet – there are individual plants in which there are dimorphic fruit (ray cypselas with swollen apices and ab/adaxial margins, disc cypselas flat) and other plants in which they are monomorphic (all flat). The cypselas in *A.E. Orchard 1441* have mostly straight eglandular hairs, although occasionally some are very slightly apically-curved.

Davis (1955) referred three collections by Miss S. Brooke to this species. Her specimen from Israelite Bay (MEL 692695) belongs here but Brooke's specimen from near Mt Ragged (MEL 692727) collected in 1889 is probably best referred to *B. ibericifolia* s.lat.; it has comparatively long, apically-curved hairs on the cypselas and mostly basal and near basal leaves, the few mid and upper cauline leaves all being entire. In regard to cypselas morphology, Brooke's specimen (MEL 220532), collected in 1866 from halfway between Mt Ragged & Victoria Spring, appears to be a reasonable match with *B. eyrensis*, the cypselas being only slightly more thickened and apparently all lacking apical swellings. However, although they may have simply been lost, the cypselas apparently lack hairs, the plants have a well-developed indumentum of eglandular cottony hairs – cottony hairs are usually absent or few in number – and the bracts have a well-defined midrib. I feel that it should be excluded from the circumscription of the species and have simply determined it as *B. aff. eyrensis*.

#### *Selected specimens examined.*

WESTERN AUSTRALIA: Escape Is., 1 Nov. 1985, *G.J. Keighery & J.J. Alford 297* (PERTH); 0.8 km NNE of Lake Cronin, 7 Oct. 1981, *K. Newbey 9247* (PERTH); c. 38 km N of the coast at Stokes Inlet, 10 Oct. 1968, *A.E. Orchard 1441* (AD, CANB, PERTH); Cape Arid N.P., Thomas River, 30 Sept. 1990, *P.S. Short 3901* (AD, MEL, PERTH); Round Island, 8 miles SW of Mondrain Island, Recherche Archipelago, Western Australia, 18 Nov. 1950, *J.H. Willis* (MEL 220533).

**40. *Brachyscome gilesii* P.S.Short, sp. nov.**

**Type:** South Australia. 119 km N of Glendambo along Stuart Hwy, c. 15 km S of turn-off to Twins Hmsd, 30°09'S, 135°14'E, open *Acacia* tall shrubland, 26 Aug. 1989, *P.S. Short* 3682 (**holotype:** MEL 1577696; **isotypes:** AD, CANB, TNS).

*Brachyscome iberidifolia* var. *glandulifera* J.M.Black, Trans. & Proc. Roy. Soc. South Australia 52: 228 (1928) ("*Brachycome*"); J.M.Black, Fl. S. Austral. 585 (1929) ("*Brachycome*"). — **Type citation:** "Flinders Range (southern portion); Wynbring; Everard and Musgrave Ranges. - Central Australia." **Lectotype:** Musgrave Ranges, July 1926, *Basedow* 265 (AD 98419308 p.p., ex herb. J.M.Black). (Davis 1948, p. 208). **Isolectotypes:** AD 98419309 p.p. (ex herb. J.M.Black), K 000882284. **Remaining syntypes:** Bitter Well, Coondambo, 29 Oct. 1929, *J.B. Cleland* (AD 98419308 p.p., ex herb. J.M.Black); Wynbring, 5 Sept. 1920, *E.H. Ising* (AD 98419308 p.p., ex herb. J.M.Black); east of Everard Ranges, 17 Aug. 1914, *S.A. White* (AD 98419309 p.p., ex herb. J.M.Black). **Excluded syntypes:** plains near Hawker, 4 Oct. 1916, *J.M. Black* (AD, MEL) (not *B. gilesii*, belonging to *B. exilis* s.lat.); plain near Hawker, 21 Oct. 1916, *J.M. Black* (K 000882285) (not *B. gilesii*, belonging to *B. exilis* s.lat.).

[*Brachyscome iberidifolia* auct. non Benth.: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 208 (1948) ("*Brachycome*") p.p., as to most cited specimens from S.A.; E.L.Robertson, J.M.Black's Fl. S. Austral. 853, Fig. 1152N (1965, rev. edn) ("*Brachycome*"); Jessop, Fl. Centr. Austral. 371 (1981) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1454, Fig. 656B (1986) ("*Brachycome*").]

Annual herb, ascending to erect, stem and major branches c. 5 to more than 30 cm long, with a sparse to conspicuous indumentum of glandular septate hairs c. 0.06–0.1 mm long on major axes, leaves and bracts. *Leaves* with the first basal and near basal leaves and 1 or 2 uppermost leaves linear and entire but most leaves 1-pinnatisect, (5) 10–40 mm long, with usually c. 6–12 oblong to linear lobes c. 0.5–1.5 mm long, 0.15–1 mm wide; all leaves commonly with septate glandular hairs and the apex of the leaf and larger lobes often shortly dilated. *Peduncles* usually manifestly exceeding the uppermost leaves. *Involucre* c. 4–8 mm diam. *Bracts* 13–20, in 1 or 2 indistinct rows and of similar length, or any inner bracts slightly shorter than the outer, elliptic to narrowly elliptic, obtrullate to narrowly obtrullate or obovate to oblanceolate in outline, 2.6–4.7 mm long, 0.8–1.8 mm wide, with apices acute to obtuse; mainly herbaceous but with narrow, hyaline margins and apices, margins entire or slightly and irregularly shortly lacinate, externally glabrous or more commonly with few to many shortly stalked glandular hairs. *Receptacle* subconical, somewhat honey-comb-like (areolate), glabrous. *Ray florets* 13–21. *Ray corolla* 7.3–13.6 mm long, 2–3.4 mm wide, variously described as white, mauve, purple, pale purple and bluish-pink, veins c. 4. *Disc florets* 57–246, 5-lobed, yellow; corolla tube 1.2–1.9 mm long. *Stamens* 5; anthers 0.64–1.0 mm long, apical appendages absent, or barely produced and less than c. 0.04 mm long. *Styles* c. 1.5–2.1 mm long, arms c. 0.85–

1.2 mm long, appendages somewhat oblong in outline. *Cypselas* flattened when immature but at full maturity somewhat obovoid or club-shaped, c. 1–1.5 mm long, 0.6–0.7 mm wide, straight or slightly longitudinally curved, ab/adaxial margins indistinct at maturity, entire fruit brownish except for yellowish base; eglandular hairs mostly covering the fruit but the apex tending to be bare, straight, 0.08–0.12 mm long, apically minutely and evenly or slightly unevenly bifid (but not or barely evident under  $\times 50$  magnification); pericarp with 2 vascular bundles, large secretory canals absent; carpopodium a narrow ring several cells high, often difficult to detect. *Pappus* absent. *Chromosome number:*  $n = 9$ . **Fig. 31, 31.**

**Distribution.** Widely distributed in arid regions of South Australia (from the N.T. border to as far south as northern Eyre Peninsula) and the Northern Territory (below c. 24°S), and with a single specimen, from the Mulligan River area, recorded for Queensland.

**Habitat.** Common in very open *Acacia*-dominated shrubland or woodland on sand or sandy loam.

**Phenology and reproductive biology.** Flowers mostly August to November.

Estimates of pollen sterility from *P.S. Short* 3682, collected north of Glendambo, S.A., ranged from 4% to 52%. This affected pollen:ovule ratios; an estimated ratio for a capitulum with 52% pollen sterility was 1,134 while for a specimen with 4% pollen sterility the ratio was 3,394.

**Cytology.** A chromosome number of  $n = 9$  for this species was first recorded by Smith-White et al. (1970) and confirmed in Carter (1978a). The determination was based on collections from Curtin Springs, N.T., and in both cases was erroneously referred to *B. parvula*. There is also an unpublished determination of  $n = 9$  noted on the specimen *S. Smith-White* 8097 (SYD) collected south of Coober Pedy, S.A. The same number was reported by Watanabe & Short (1992, as "*B. iberidifolia* Benth. complex") for specimens (*P.S. Short* 3673 & 3682) collected north of Glendambo, S.A.

**Etymology.** Named in honour of the explorer Ernest Giles (1835–1897), who collected plants for Ferdinand Mueller at MEL and was apparently the first to collect the species, having gathered it "Between the Alberga & Mt Olga" in 1873/4 (MEL 692842), from Mount Eba in 1880 (MEL 692843), and near Mount Everard in 1882 (MEL 692604).

**Notes.** Cypselas and leaf morphology and the oblong style appendage suggest a close affinity with *B. billabongensis* and *B. simulans*. It differs from *B. simulans* in lacking a pappus and from *B. billabongensis* in having a sparse to conspicuous indumentum of stalked glandular hairs 0.06–0.1 mm long (not a few hairs which are less than c. 0.04 mm long).

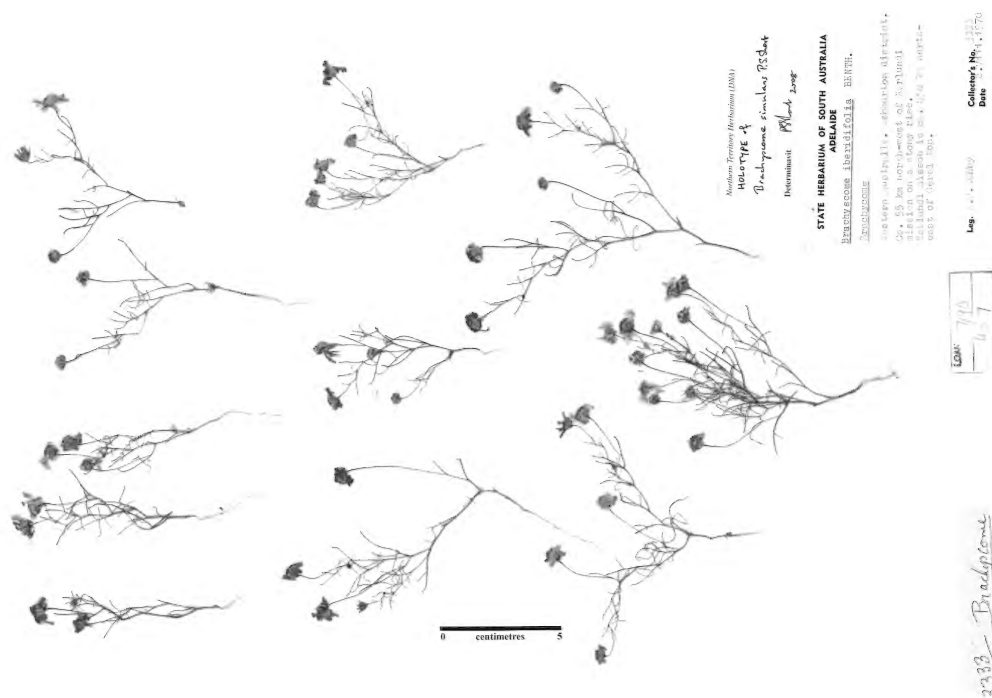


Fig. 32. Holotype of *Brachyscome similans* (AD), A.M. Ashby 3333.

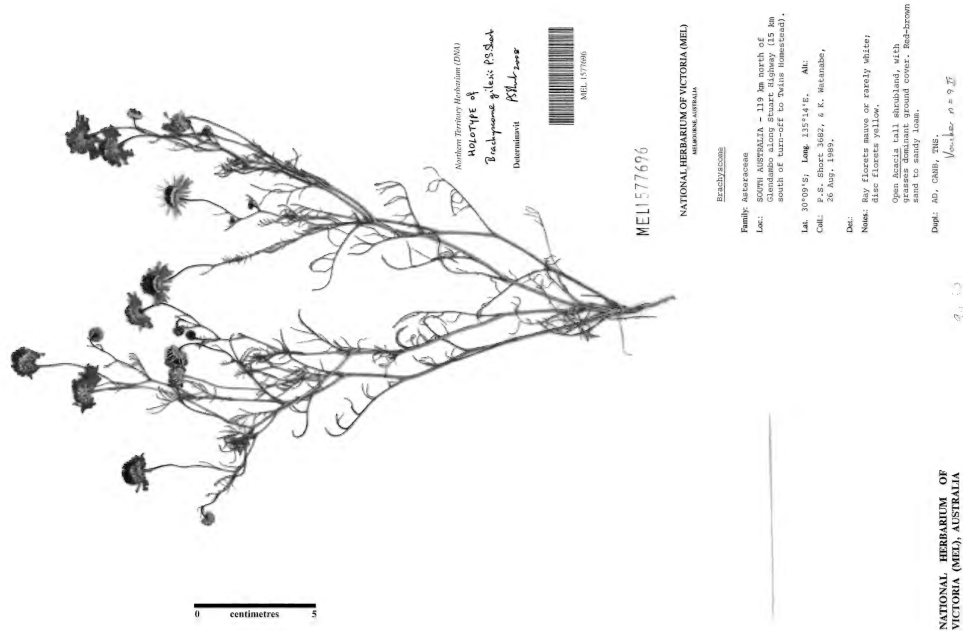


Fig. 31. Holotype of *Brachyscome gilesii* (MEL), P.S. Short 3682.



Fig. 33. *Brachyscome iberidifolia* (a) "Wreath entity", Paynes Find, W.A. — P.S. Short 3811.

#### *Selected specimens examined.*

NORTHERN TERRITORY: c. 24 km NNW of Poepfels Corner, 19 Sept. 1987, *G.J. Leach 1474* (AD, CANB, DNA, MEL); 3 miles N of Mulga Park Hmsd, 19 Sept. 1968, *A. Nicholls 957* (DNA, PERTH).

SOUTH AUSTRALIA: 6 km SSW of Lake Windabout, 24 Sept. 1991, *F.J. Badman 5010* (AD, BRI, MEL); Commonwealth Hill Stn, c. 90 km NW of Tarcoola, 26 Sept. 1971, *B. Lay 491* (AD); 9.2 km NE of Mount Finke, 6 Oct. 1987, *D.E. Symon NPWS1104* (AD).

QUEENSLAND: Mulligan River, Feb. 1904, *H. Clarke* (NSW 15498).

#### 41. *Brachyscome iberidifolia* Benth.

in Endl. et al., Enum. Pl. Huegel 59 (Apr. 1837) ("*Brachycome*"; Benth., Fl. Austral. 3: 512 (5 Jan. 1867) ("*Brachycome*"; DC., Prodr. 7: 276 (1838) ("*Brachycome*"; G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 208, Fig. 84 & 97, pl. vi, map 25 (1948) ("*Brachycome*"), p.p., as to W.A. only; Grieve & Blackall, How Know W. Austral. Wildfl. 803 (1975) ("*Brachycome*"; N.S.Lander in Marchant et al., Fl. Perth Region 663 (1987) ("*Brachycome*"; E.Salkin et al., Austral. Brachyscomes 130 (1995), p.p., as to W.A. only. — **Type citation**: "Swan-River. (Hügel.)." **Isotypes**: K 000882290 (one sheet, the three plants for the most part glabrous but with short, stalked glandular hairs on some leaves and parts of the stems), W (two sheets).

*Brachyscome capillacea* Walp., Repert. Bot. Syst. 2: 584 (Aug. 1843) ("*Brachycome*"). — **Type citation**: "Crescit in Nova Hollandia ad Swan River (v.s. sp.)." Location of specimens unknown. Steetz (1845) included it under *B. iberidifolia* and Benth (1867), citing Steetz, did the same.

*Brachyscome iberidifolia* var. *alba* Steetz in Lehm., Pl. Preiss. 1: 425 (Aug. 1845) ("*Brachycome*"). — **Type citation**: "In arenosis subhumidis umbrosisque inter gramina alta ad fluvii Cygnorum ripam prope Pointwater, d. 18. Julii 1839. Herb. Preiss No. 97." **Lectotype**: Pointwater, *J.A.L. Preiss 97* (MEL 220332 p.p., ex herb. Steetz). (Davis 1948, p. 209). **Isolectotypes**: LD n.v. (Lander 1988), MEL 220332 p.p., S 07-7474 (per JSTOR).

*Brachyscome iberidifolia* var. *divergens* Steetz in Lehm., Pl. Preiss. 1: 426 (Aug. 1845) ("*Brachycome*"). — **Type citation**: "In solo limoso districtus Vasse, mense Dec.



Fig. 34. *Brachyscome iberidifolia* (e), Mt Chudalup, W.A. — P.S. Short 4125.

1839. Herb. Preiss No. 96." **Lectotype**: Vasse district, *J.A.L. Preiss 96* (MEL 220329, ex herb. Steetz). (Davis 1948, p. 209). **Isolectotypes**: LD n.v. (Lander 1988), S 07-7475 (per JSTOR).

*Brachyscome iberidifolia* var. *huegeliana* Steetz in Lehm., Pl. Preiss. 1: 425 (Aug. 1845) ("*Brachycome*"), nom. illeg., includes type of *B. iberidifolia* in protologue. — **Type citation**: "In turfosis ad fluvium Cygnorum haud procul ab oppidulo Fremantle, d. 16. Dec. 1838. Herb. Preiss. No. 94." **Lectotype**: near Fremantle in turf spots near the Swan River, *J.A.L. Preiss 94* (MEL 220333 p.p., excluding isolectotypes). (Davis 1948, p. 209). **Isolectotypes**: G n.v. (Lander 1988); LD n.v. (Lander 1988); MEL 220333 p.p., excluding lectotype; MEL 220331, perhaps excluding plant on right hand side, MO 797846, P 00742961 (per JSTOR), P 00742962 (per JSTOR), P 00742966 (per JSTOR), S 07-7476 (per JSTOR).

*Brachyscome iberidifolia* var. *major* Steetz in Lehm., Pl. Preiss. 1: 425 (Aug. 1845) ("*Brachycome*"). — **Type citation**: "In solo limoso sylvae prope Limekilns, Perth, d. 23. Sept. 1839. Herb. Preiss. No. 95." **Lectotype**: Perth, in calcareous soil near Limekilns, *J.A.L. Preiss 95* (MEL 220330 p.p., excluding isolectotypes). (Davis 1948, p. 209). **Isolectotypes**: G 00222784 (per JSTOR), K 000882283 (ex TCD and anomalously numbered (see McGillivray 1975) as *Preiss 567*), LD n.v. (Lander 1988), MEL 220330 p.p.(excluding lectotype), P 00742964 (per JSTOR), S 07-7477 (per JSTOR).

*Brachyscome iberidifolia* var. *fl. albo* J.F.W. Bosse, Neue Allgemeine Deutsche Garten- und Blumenzeitung 3: 114 (1847) ("*Brachycome*"; as var. '*flore-albo*' in APNI).

*Brachyscome iberidifolia* var. *diffusa* Benth., Fl. Austral. 3: 513 (5 Jan. 1867) ("*Brachycome*"). — **Type citation**: "Murchison river, Oldfield." **Type**: K 000882286.

*Brachyscome iberidifolia* f. *alba* Siebert & Voss, Vilm. Blumengartn. ed. 3, 1: 453 (1894) ("*Brachycome*"). — **Type**: not cited.

*Brachyscome iberidifolia* f. *bicolor* Siebert & Voss, Vilm. Blumengartn. ed. 3, 1: 453 (1894) ("*Brachycome*"). — **Type**: not cited.

*Brachyscome iberidifolia* f. *coerulea* Siebert & Voss, Vilm. Blumengartn. ed. 3, 1: 453 (1894) ("*Brachycome*"). — **Type**: not cited.

*Brachyscome iberidifolia* f. *rosea* Siebert & Voss, Vilm. Blumengartn. ed. 3, 1: 453 (1894) ("*Brachycome*"). — **Type**: not cited.

*Steiroglossa chamomillifolia* DC., Prodr. 6: 39 (Jan. 1838), ("chamomillaefolia"). — **Type citation:** "in orâ austr-occid. Novae-Hollandiae ad freti regis Georgii regionem borealem legit cl. [T.] B. Wilson ... (v.s. comm. à cl. Allan-Cunningham.)." **Holotype:** Discovered in the country on the north of King George's Sound, T.B. Wilson (G-DC). **Isotype:** country on the north of King George's Sound, 1829, Dr Wilson (K 000882289; ex Cunningham herb., presented by Heward).

No description of *B. iberidifolia* is supplied here but all specimens to which I have added the determination '*B. iberidifolia* Benth. complex' have cypselsas with eglandular hairs with curled apices.

**Distribution.** Confined to Western Australia.

**Cytology.** Chromosome numbers of  $n = 9$  and  $2n = 18$  have been determined for many collections which I refer to the *B. iberidifolia* complex, i.e. *B.L. Turner* 5349, 5452, 5459 & 5486 (Turner 1970); *P.S. Short* 3810, 3860 & 3874 (Watanabe & Short 1992); *P.S. Short* 4065, 4074, 4077, 4087, 4124, 4125, 4227, 4533 & 4550 and *K. Watanabe* 111, 113, 161, 164 & 175 (Watanabe et al. 1996b).

Carter (1978a) also reported  $n = 9$  for *B. iberidifolia*. The only cited voucher specimen seen by me, collected 43 km ("27 miles" on label) N of Salmon Gums and housed in SYD, belongs to this complex.

Turner (1970) recorded  $n = 18$  for a specimen (*Turner* 5403) of the distinctive entity referred to below from the Gascoyne River region.

**Notes.** In this species, as defined by Davis (1948), there is major variation in specimens that are presently referred to *B. iberidifolia*. This includes variation in habit (spreading to erect), vestiture (presence or absence and morphology of glandular hairs), leaf (entire to variously divided), involucre bracts (size, extent of development of hyaline margins), length of ray corolla, and cypselas morphology (extent of development of ab/adaxial margins and apical swellings, colouration, length and perhaps placement of eglandular hairs, and the extent of development of size dimorphism between ray and disc florets). It was for this reason that, when previously reporting (Watanabe & Short 1992, Watanabe et al. 1996b) chromosome number determinations, many populations seemingly representative of distinct but unresolved taxa were simply referred to the "*Brachyscome iberidifolia* complex". Unfortunately, there is still little resolution of what is undoubtedly a complex of closely related taxa, at least some of which I expect to be eventually recognised as distinct species. These include:

(a) an entity from the Paynes Find district, e.g. as represented by *M.G. Corrick* 10941 (MEL). Salkin et al. (1995) referred to it as "Wreath *Brachyscome*", this in reference to the spreading habit of the plant and the capitula being on the end of branches (see Fig. 33).

(b) a coastal form with, among other things, large and somewhat succulent and often toothed or linear-

lobed leaves, e.g. *G.J. Keighery* 5277 (MEL, PERTH) and *P.S. Short* 4555 (AD, CANB, MEL, PERTH, S) from Cosy Corner and *P.S. Short* 4550 (MEL, PERTH) from Cape Leeuwin.

(c) glandular-hairy plants with rigid leaves, etc., e.g. *P.S. Short* 4304A (AD, BRI, CANB, MEL, NSW, PERTH) from Yannerie River along the NW Coastal Hwy, and *P.S. Short* 2104 (MEL, PERTH) from the Denham area.

(d) glandular hairy plants from the Gascoyne River region, e.g. *P.S. Short* 2068 and *B.L. Turner* 5403. A distinctive attribute of this entity is the presence of largish, biseriate multiseptate stalked glandular hairs as found in *Roebuckia*; examination of cleared, softened fruit revealed no secretory canals diagnostic of that genus.

(e) a distinctive taxon which appears to be restricted to Mt Chudalup and which has particularly conspicuous ray florets and 1- and 2-pinnatisect leaves, in which the largest linear segments are very fine. It is represented by *P.S. Short* 4125 (Fig. 34), which is also a voucher for the chromosome number determination of  $n = 9\text{II}$  or  $9\text{II} + \text{B1}$  (Watanabe et al. 1996b). Had my specimens not become somewhat mouldy, due to storage problems which existed in DNA before extensive refurbishment, I was considering formally naming this taxon as a distinct species.

(f) an entity represented by *P.S. Short* 3801 (AD, MEL, PERTH) from the shores of a saline depression c. 5.5 km east of Yellowdine, which in habit approaches *B. pusilla* but in which the basal leaves tend to be spatulate – not somewhat linear – and prominently toothed. It is widespread on the margins of saline depressions in south-western Western Australia. Fruit from *L. Haegi* 2552 (Fig. 3H, 10F), also from the above locality near Yellowdine, have two vascular bundles in the pericarp and lack secretory canals, while the testa is composed of thin-walled cells.

There are also other entities but how well they, and the others briefly noted above, are delineated from each other needs thorough investigation. As also noted below, plants not too dissimilar to *B. pusilla* s.str. have also been referred to *B. iberidifolia* s.lat., their status also requiring further investigation. *Brachyscome pusilla* and at least the entities referred to above from Cosy Corner, Mt Chudalup and Yellowdine all have cypselsas with concave lateral surfaces.

Under this name Salkin et al. (1995) referred to and illustrated an entity from Thargomindah, Qld. In this treatment I have referred it to *B. exilis*, not because I believe that it is definitely of that species but because it is more in keeping with previous treatments of *B. exilis* and because it excludes it from *B. iberidifolia* s.str., from which it is clearly distinct.

Type specimens of the name *B. iberidifolia* Benth. have been examined at both K and W but I have not made direct comparison with specimens held in Australian

herbaria. None-the-less, I have little doubt that specimens with conspicuous blue or white ray corolla and pinnatisect leaves with linear lobes, particularly those found in the Perth region, are of *B. iberidifolia* s.str. These include specimens such as *M.G. Corrick* 9398 (MEL, Serpentine Pipehead Dam), *Cranfield* 5047 (PERTH, Muchea), *H. Demarz* 7608 (CANB, PERTH, Cavalier Park), *M. Koch* 169 (PERTH, Collie basin), *A. Morrison* (CANB, Cannington) and *M.E. Phillips* (CBG 15554, north of Bunbury), although at least in the presence and distribution of glandular hairs they are somewhat variable.

I have not attempted to trace type specimens of the names coined by J.F.W. Bosse and by Siebert & Voss and assume they apply to mere colour forms of *B. iberidifolia* s.str.

#### 42. *Brachyscome pusilla* Steetz

in Lehm., Pl. Preiss. 1: 427 (1845) ("*Brachycome*"); Benth., Fl. Austral. 3: 513 (1867) ("*Brachycome*"), p.p., including *B. bellidioides* in synonymy; G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 216, Fig. 90, 101, pl. vi, map 27 (1948) ("*Brachycome*"); Grieve & Blackall, How Know W. Austral. Wildfl. 803 (1975) ("*Brachycome*"); N.S. Lander in Marchant et al., Fl. Perth Region 663 (1987) ("*Brachycome*"); E. Salkin et al., Austral. Brachyscomes 190 (1995). — **Type citation**: "In arenosis sylvae ad fluvium Helena, d. 31. Augusti 1839. Herb. Preiss. No. 86 et in clivulo calcareo haud procul ab oppidulo Freemantle, d. 15. Aug. 1839. No. 98 (? specimina non fructifera.)". **Lectotype**: near Helena River, W.A., *J.A.L. Preiss* 86 (MEL 220571 p.p., ex herb. Steetz). (Davis 1948, p. 216, Fig. 90). **Isolotypes**: G 222780 (per JSTOR); LD n.v. (Lander 1988); MEL 220571 p.p. (excl. lectotype, ex herb. Steetz), S 07-7463 (per JSTOR). **Remaining syntypes**: Calcareous gully not far from Fremantle, *Preiss* 98 (MEL 220571 p.p., ex herb. Steetz); (MEL 239424, ex herb. Sonder, labelled "Swan River" but numbered *J.A.L. Preiss* 98).

*Herb*, annual, glabrous, to c. 9 cm tall. *Leaves* basal and cauline but mostly basal or near basal, linear or sublinear, c. 10–25 mm long, c. 0.5–1 mm wide, entire or with several oblong lobes, apically mostly obtuse and slightly dilated. *Involucral bracts* c. 2.5 mm long, 1 mm wide, mostly herbaceous but with well-developed hyaline apices and margins which may have greenish tints. *Ray corolla* probably white. *Disc florets* with corolla tube 0.9–1.2 mm long, mostly yellow but lobes partly greenish; style green. *Cypselas* c. 1.3 mm long, 0.64 mm wide, mature fruit seemingly pale brown, with thick ab/adaxial ribs and concave lateral surfaces which are minutely papillate; with scattered eglandular hairs which are apically-curved and c. 0.1–0.2 mm long. *Pappus* absent.

*Distribution*. South-western Western Australia, possibly confined to a few populations in the near-vicinity of Perth.

*Cytology*. There are reports of this species having  $n = 9$  (Carter 1978a, Fitzgerald River region, *C.R. Carter* 8403, SYD; Watanabe et al. 1996b, Lake King, *P.S.*

*Short* 4533, MEL) but I doubt that they should be referred to *B. pusilla* and have simply redetermined the voucher specimens as being of *B. iberidifolia* s.lat.

*Typification*. The lectotype specimen comprises a single plant with branches at the base and only has entire leaves. Several other elements of the type series, i.e. the isolotype specimens on the same sheet, also branch at the base and have undivided linear leaves or, in two cases, have a leaf with one or two short (c. 0.5 mm long) lobes. There is a discordant element (second from left on MEL 220571) among the isolotypes. It is a poor specimen in that it lacks capitula. It is also unbranched but in having linear basal leaves is similar to the other elements. However, it differs from the lectotype and definite isolotype specimens mounted on this sheet in having two upper leaves with long, linear lobes. (I have considered the possibility that the apparent leaves are actually shrivelled branchlets with single leaves but even though it is a poor specimen this doesn't seem likely). This aspect suggests to me that this particular element is of another taxon, if not *B. iberidifolia* s.str., then another in the *B. iberidifolia* complex.

A small packet labelled by Davis as containing "Florets & fruit removed from Lectotype" – and which should be considered to be part of the lectotype specimen – contains only a single ray floret. The immature fruit is somewhat flat and beset by long, apically-curved hairs. Other material simply labelled as coming from *L. Preiss* 86 is contained in another envelope.

*Notes*. I don't doubt that this name should stand, and that it applies to a south-western Western Australia taxon, but I am uncertain as to the circumscription of the species. The brief description above is based on the type specimen and, extrapolating from that, there are few other specimens which I can confidently attribute to this species. I believe the remaining syntype *J.A.L. Preiss* 98 (MEL) from near Fremantle, *A. Morrison* (CANB 209956) from Armadale, and *R. Cranfield* 1418 (PERTH) from Alfred Cove, belong here, as perhaps does *P.S. Short* 3868 (MEL, PERTH) from Lake Dalaroo.

There are many other specimens such as *J. Seabrook* 375 (CANB, PERTH) from the lower Helena Valley, *A. Morrison* (CANB 468011) from Midland Junction, *A. Morrison* (PERTH 410756) from Cannington and *R. Helms* (PERTH 419052) from Pinjarra which have simple linear leaves but, among other things, these are larger, more branching specimens and, at least in the Helms specimen, the cypselas are grey and have much shorter eglandular hairs than the type specimen. I have simply referred such specimens to the *B. iberidifolia* complex. Similarly, there are many specimens which have at least some variously divided leaves as well as many entire linear leaves and which undoubtedly approach *B. pusilla* and indeed may be of that species; they are common on the sandy margins of saline depressions. Again I have simply annotated them as being members of the *B. iberidifolia* complex.



**43. *Brachyscome simulans* P.S.Short, sp. nov.**

**Type:** Western Australia. c. 55 km NW of Karlundi [Karlundi] Mission on a stony rise, 8 Aug. 1970, A.M. Ashby 3333 (**holotype**: AD 971040382).

*Annual herb*; major axes ascending to erect, c. 7–23 cm long, flexuose, reddish-brown, branching at basal and near basal as well as upper nodes, each axis terminating in a capitulum, mostly glabrous but with scattered to dense patches of stalked glandular hairs c. 0.04–0.2 mm long, eglandular hairs absent. *Leaves* basal and cauline, alternate, linear and entire, to c. 5–23 mm long, c. 0.3 mm wide, with variably inrolled margins, or 1-pinnatisect, each margin with 1–3 linear-subcylindrical lobes c. 5–15 mm long, apices of entire leaves and lobes blunt or innocuously mucronate and often dilated and spoon-like, glabrous, or with stalked glandular hairs as on stem and branches. *Involucre* c. 4–6 mm diam. *Bracts* c. 11–17, in 1 row, of about equal length, overlapping, obovate to oblanceolate or elliptic, 3.3–3.7 mm long, 1–1.6 mm wide, sterome herbaceous and slightly cartilaginous, with a conspicuous externally indented orange midvein, with prominent hyaline entire or almost entire margins and apices, outer surface glabrous or with very shortly stalked glandular hairs as on leaves. *Receptacle* hemispherical, pitted, glabrous. *Ray florets* 9–13. *Ray corolla* c. 10–11 mm long, c. 2.1–2.5 mm wide, mauve; veins (3) 4 or 5; apex obtuse, not or minutely 2-lobed. *Disc florets* c. 63–93, corolla 1.2–1.5 mm long, 5-lobed, yellow, externally with conspicuous biseriate, septate, tapering hairs c. 0.1–0.16 mm long with a minute apical gland. *Stamens* 5; anthers with microsporangia c. 0.9 mm long, appendage absent; filament collar c. 0.3 mm long, straight in outline and basally not thicker than the filament. *Style* 2.5–2.9 mm long; arms 1.15–1.35 mm long; appendages oblong, 0.77–0.9 mm long, yellowish brown or greenish; stigmatic surface 0.35–0.53 mm long. *Cypselas* monomorphic, somewhat flattened, in outline manifestly tapering from apex to base, in outline somewhat obtriangular to cuneate, c. 1.3–1.6 mm long, 0.6–0.8 mm wide, straight or slightly longitudinally curved; ab/adaxial margins evident but not manifestly distinct, smooth; entire fruit mostly dark purple-brown but the acute base, the thickened obtuse apex and to some extent the ribs yellow-brown; eglandular hairs covering the fruit except for the bare apex, straight, 0.12–0.4 mm long, apically minutely bifid (but bifid apex not or barely evident under  $\times 50$  magnification); pericarp with 2 vascular bundles, large secretory canals absent; carpodium seemingly absent. *Pappus* a crown of weak, multicellular bristles of unequal length joined at the base, the longest bristles c. 0.3–0.4 mm long. *Chromosome number*: unknown. **Fig. 3J, 32.**

*Distribution.* Western Australia, with the only known specimens collected in the Meekatharra region, the type specimen being collected c. 100 km north of the town and the two others of known locality 10–12 km south of the town.

*Habitat.* Both the type specimen and *H. Demarz* 4377 were merely recorded as being from stony ground, while plants comprising *P.S. Short* 4233 were recorded as growing in red-brown sandy loam in open *Acacia* shrubland.

*Phenology and reproductive biology.* The only specimens, all flowering, were collected in August.

A pollen:ovule ratio of 4,825 was determined for a capitulum, with 13 ray and 93 disc florets, of *P.S. Short* 4233; no pollen sterility was observed.

*Etymology.* The specific epithet reflects the vegetative resemblance to *B. billabongensis*.

*Notes.* *Brachyscome simulans* differs from most species of *Brachyscome* by having cypselas mostly covered in straight, biseriate, eglandular hairs, as seen also in *B. billabongensis* and *B. gilesii*. It differs from both of these species in having a pappus. Vegetatively it is similar to *B. billabongensis*, but as well as having a pappus it differs from that species in its often larger capitula (c. 4–6 mm, not c. 1.7–4 mm diam.) and longer ray corollas (c. 10–11 mm, not 7–8 mm long).

*Additional specimens examined.*

WESTERN AUSTRALIA: no locality or date, *Blockley* 136 (PERTH); 12 miles S of Meekatharra, 22 Aug. 1973, *H. Demarz* 4377 (AD, CANB, PERTH *n.v.*); 10 km S of Meekatharra, 26 Aug. 1995, *P.S. Short* 4233 (MEL).

***Brachyscome lineariloba* group**

*Brachyscome lineariloba* group: P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 849 (1999).

*Annual herb*; major axes ascending to erect, glabrous or with glandular hairs. *Leaves* basal and cauline, alternate; first-formed leaves and uppermost leaves entire, most leaves 1-pinnatisect, glabrous or with eglandular and stalked glandular hairs. *Bracts* in 1 row, equal, overlapping, mainly herbaceous but margins and apices hyaline. *Receptacle* hemispherical, subconical or conical, areolate or pitted, glabrous. *Ray florets* corolla white or mauve. *Disc florets* corolla yellow. *Stamens* 5; anthers with terminal anther appendage manifestly exceeding the microsporangium; endothelial tissue with radial thickening; filament collar straight in outline and basally not thicker than the filament. *Style* arms with short, widely deltate to deltate appendages (not recorded for all spp.). *Cypselas* monomorphic, straight or curved along their length, with each of the lateral surfaces consisting of a single, entire or lobed, swollen ridge composed of large-celled parenchyma tissue; ab/adaxial margins entire; apically inrolled eglandular biseriate hairs present; pericarp lacking secretory canals, internally with the swollen lateral surface consisting of large-celled parenchyma but with an inner continual layer of sclerenchyma 1–several cells wide extending around the testa; vascular bundles c. 4 or 6, always with 1 on each of the ab/adaxial margins and 1 or 2 smaller ones on each lateral surface; testa of thin-walled cells;



carpopodium seemingly absent and basally with a whitish peg-like pedicel. *Pappus* of short, basally fused wide elements or bristles much shorter than the corolla tube. *Chromosome numbers*:  $n = 2, 3, 4, 4\text{II} + 2\text{I}, 5, 6, 8$ ;  $2n = 4, 6, 8, 10, 12, 16$ .

*Distribution*. Species of semi-arid and arid regions of southern mainland Australia.

*Notes*. All species in this group are characterised by having fruit with a single swollen ridge on each lateral surface, a peg-like base, and mostly long, apically inrolled eglandular hairs on the surface. These features, together with the mostly linear segments of the 1-pinnatisect leaves readily distinguish them from other species of *Brachyscome* s.lat.

Morphological attributes suggest two informal subgroups within this group, a Subgroup *lineariloba* and a Subgroup *erigona*, the membership and characteristics as follows:

(a) Subgroup *lineariloba* (*B. breviscapis*, *B. dichromosomatica*, *B. lineariloba*)

- cypselas straight
- cypselas longitudinal ridges entire, not at all wing-like but may be slightly dilated in the upper part
- disc corolla lobes with apical hairs
- pappus elements mostly somewhat scale-like (but not markedly so in *B. dichromosomatica*) and each element many cells wide.

(b) Subgroup *erigona* (*B. campylocarpa*, *B. eriogona*, *B. smithwhitei*, *B. watanabei*)

- cypselas curved
- cypselas longitudinal ridges mostly manifestly wing-like, but not always apparent in *B. eriogona*
- disc corolla lobes lacking apical hairs
- pappus elements mostly bristle-like, usually each element only several cells wide, but sometimes wider and slightly scale-like.

However, the absence or presence of a few apical hairs at the apex of the corolla lobes may not be correct, but rather a reflection of low sampling, while the difference between bristle-like and scale-like pappus elements is somewhat subjective rather than a clear-cut distinction. It is also difficult to see that variation in fruit curvature is of great significance. Thus, morphologically, there is good support for a very close relationship of all species within the broader *B. lineariloba* complex. Furthermore, this conclusion is supported by Watanabe et al. (1976) who, in their discussion of studies of asynchronous chromosome condensation and meiotic behaviour in *B. dichromosomatica* and *B. eriogona* (referred to by them as *B. lineariloba* A and *B. campylocarpa* A respectively), commented that “the morphological similarity of [*B. eriogona*] and [*B. dichromosomatica*] suggests a close relationship, and this view is supported by the fact that hybrids between them can be readily obtained in the glasshouse”, albeit that a very high occurrence of univalent formation at meiosis indicated that the relationship may not be as close as expected. Cooke (1986) similarly suggested a close relationship

between the species of this group, noting for example that “*B. eriogona* is closest to *B. dichromosomatica* and, in many characters, intermediate between this species and *B. campylocarpa*” (Cooke 1986, p. 1452).

As noted in the introduction, I believe that the results of molecular work carried out to date on *Brachyscome* must be treated with considerable caution, those obtained for the *B. lineariloba* group being an example where they are at considerable variance to the close relationship suggested by morphological and cytological data. Thus, in the results of the phylogenies of *Brachyscome* s.lat. presented by Denda et al. (1999) and Field et al. (2006) – the former comparing nucleotide sequences of the chloroplast *matK* gene and the latter the sequences of the Internal Transcribed Spacer regions (ITS1 and ITS2) within the genes which code for cytoplasmic ribosomal RNA – the members of the *B. lineariloba* group were split into distinct clades; two in the case of Denda et al. (1999), and three in the case of Field et al. (2006), in the latter case the respective clades being far removed from each other and not even sister clades.

Morphologically, the presence of swollen, longitudinal ridges on the lateral surfaces of the fruit indicates affinities of this species complex with both the genus *Roebuckia* and the *Brachystephium* group. However, in both of these groups the longitudinal ridges are horse-shoe-shaped (i.e. an inverted “u”). Species of *Roebuckia*, as in this group, do have linear leaf segments but their cypselas always have large secretory canals in the pericarp and all have a base chromosome number of  $x = 9$ .

In regard to the *Brachystephium* group the leaves of the component species are shortly incised, the lobes are never linear, and there appears to be an effective base chromosome number of  $x = 4$ . That said, the *Brachystephium* group and the *B. lineariloba* group are closely related in that they share the character of inflated longitudinal ribs on the cypselas, peg-like base to the cypselas, a lack of vascular canals in the pericarp, often longitudinally curved cypselas, and the presence of anther appendages. Indeed, the sharing of such attributes suggests that the inversely u-shaped longitudinal ridges of members of the *Brachystephium* group and the single longitudinal ridge found in the *B. lineariloba* group are simply modification of a homologous character; in some members of the *Brachystephium* group, and for that matter in some members of *Roebuckia*, the usually two distinct ribs are barely distinguishable and merging of the two in members of the *B. lineariloba* group may well have occurred. Close affinity of the two groups is also supported by hybridisation experiments between *B. dichromosomatica* ( $n = 2$ ) and *B. goniocarpa* ( $n = 4$ ) which were reported by Watanabe et al. (1991). In the  $F_1$  hybrid the chromosomes derived from the two parental species showed similar condensation behaviour and, at meiosis, two *B. goniocarpa* chromosomes were found to associate with one of each of the two *B. dichromosomatica* chromosomes, with the remaining two *B. goniocarpa* chromosomes forming univalents. By

emphasising the aforementioned points it was concluded by Watanabe et al. (1991) that the placement of the two species in different superspecies (Davis 1948) was possibly not warranted. However, it is also possible to change the emphasis, by noting that pairing was very loose in both ring bivalents and that the association of two univalents and two pairs was only observed in 40 out of 109 pollen mother cells. Furthermore, the data obtained from the hybridisation experiment leaves no doubt that the two species are discrete biological entities. Artificial pollination of *B. goniocarpa* with pollen from *B. dichromosomatica* resulted in the development of only six well-developed fruit out of approximately 1,000 pollinated florets and meiosis in the  $F_1$  hybrid was highly irregular, and mature pollen totally, or almost totally, inviable (Watanabe et al. 1991).

*Cytological studies, a summation of names and numbers.* As noted in the introductory section on cytology in *Brachyscome* s.lat. the study of chromosomes in this genus effectively commenced with Smith-White's paper in which he drew attention to the presence of different numbers ( $n = 2, 6 \text{ \& } 8$ ) in *B. lineariloba* (Smith-White 1968). More details of chromosome variation in *B. lineariloba* were presented in Smith-White et al. (1970), the first major paper concerning chromosome variation in *Brachyscome* s.lat., but this was followed by a host of sequentially numbered papers (Smith-White 1968, being the first of the series) which only or primarily concerned the cytology and evolution of what they referred to as *Brachyscome lineariloba* or the *B. lineariloba* complex, i.e. Smith-White & Carter (1970), Carter & Smith-White (1972), Carter et al. (1974), Watanabe et al. (1975), Watanabe et al. (1976), Kyhos et al. (1977), Carter (1978b), Watanabe & Smith-White (1985), Watanabe & Smith-White (1987), Watanabe et al. (1991). There are two other papers which have also dealt with the *B. lineariloba* complex but were not included as part of the aforementioned sequence, i.e. Smith-White & Carter (1981) and Adachi et al. (1997).

Early in the research of the complex five biological species were informally recognised, these being named in order of discovery sp. A ( $n = 2$ ), sp. B ( $n = 6$ ), sp. C ( $n = 8$ ), sp. D ( $n = 4$ ) and sp. E ( $2n = 10$ ) (Smith-White et al. 1970). Within sp. A, Smith-White & Carter (1970) recognised three different races, designated  $A_1$ ,  $A_2$  and  $A_3$ . The use of these informal names, sometimes referred to as chromosomal races or cytodesmes, was continued until 1978, with Watanabe et al. (1975) having recognised another race or cytodeme in sp. A, this being designated  $A_4$ .

Carter (1978c) subsequently published a paper on the taxonomy of the *B. lineariloba* complex, formally recognising and naming three species: *B. breviscapis*, being "sp. D"; *B. dichromosomatica*, being "sp. A" and including two varieties, var. *dichromosomatica* incorporating cytodesmes  $A_1$ ,  $A_2$  and  $A_4$ , and var. *alba* the cytodeme  $A_3$ ; and *B. lineariloba*, which included spp. "B", "C" and "E", it being felt that none of the

aforementioned three cytodesmes could be distinguished by morphological features.

Smith-White et al. (1970), in their initial review of chromosome numbers in *Brachyscome* s.lat., recognised three entities under the name *B. campylocarpa*, i.e. *B. campylocarpa* sp. A ( $n = 4$ ), *B. campylocarpa* sp. B ( $n = 5$ ), and *B. campylocarpa* sp. A. ( $n = 6$ ). In subsequent papers discussing the relationships of members of the *B. lineariloba* complex reference was commonly made to *B. campylocarpa* "sp. A" (or "Race A") with  $n = 4$  (Watanabe et al. 1976; Kyhos et al. 1977; Watanabe & Smith-White 1987). It has since been noted (Watanabe & Short 1992) that the name *B. eriogona* applies to *B. campylocarpa* sp. A ( $n = 4$ ), while the name *B. smithwhitei* P.S.Short & K.Watan. (Short & Watanabe 1993) has been published to accommodate *B. campylocarpa* sp. A. ( $n = 6$ ), and "sp. B." ( $n = 5$ ) is *B. campylocarpa* s.str.

#### 44. *Brachyscome breviscapis* C.R.Carter

Telopea 1: 392 (1978) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1448, Fig. 654C (1986) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 56 (1995). — **Type citation:** "HOLOTYPE: 10 km S. of Elliston, S.A., *S. Smith-White and C.R. Carter*, 7042, viii. 1970 (NSW)." Not seen.

*Brachyscome lineariloba* sp. D: Smith-White et al., Austral. J. Bot. 18: 99–125, Fig. 10 (1970) ("*Brachycome*"); Smith-White & C.R.Carter, Chromosoma (Berl.) 30: 129–153 (1970) ("*Brachycome*"); Kyhos, C.R.Carter & Smith-White, Chromosoma (Berl.) 65: 81–101 (1977) ("*Brachycome*").

[*Brachycome pachyptera* auct. non Turcz.: J.M.Black, Fl. S. Austral. 4: 583 (1929) ("*Brachycome*"), p.p., as to several specimens in Black's herbarium.]

[*Brachyscome lineariloba* auct. non (DC.) Druce: G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 167, Fig. 21, 31, pl. viii (1948) ("*Brachycome*"), p.p., as to several specimens such as Cleland's from Talia; E.L.Robertson, J.M.Black's Fl. S. Austral., 852 (1965, rev. edn) ("*Brachycome*"), p.p.]

Annual herb with the only branches being one or more capitulum-bearing, ascending to erect scapes arising from the base of the plant, glabrous except for mostly occasional scattered, long-septate whitish eglandular hairs on the scapes and leaves. *Leaves* basal, held erect when fresh, somewhat succulent, entire leaves mostly sub-terete or narrowly oblong to linear, (3.5) 5–35 mm long, 0.4–2.0 mm wide and entire, occasionally spatulate in outline due to 2 short (c. 0.1 mm long) lateral lobes towards the apex, all leaves glabrous or with eglandular septate hairs as above, hairs tapering towards the apex, to c. 1.5 mm long. *Scapes* c. 5–18 (25) mm long, manifestly less than to about equalling the leaves, from 1 to c. 15 scapes per plant, glabrous or with scattered septate hairs. *Involucre* 2.7–6.6 mm diam. *Bracts* 5–12, overlapping, elliptic to narrowly elliptic, obovate to widely obovate or ovate to very widely ovate, 2.5–4.5 mm long, 0.9–3.3 mm wide, mainly thinly herbaceous and greenish but the upper slightly scarious margins narrowly white or purplish,



Fig. 35. *Brachyscome lineariloba* (left plant) and *B. breviscapis* (right plant), near Streaky Bay, S.A. — P.S. Short 3737 & 3738.



Fig. 36. *Brachyscome dichromosomatica* var. *dichromosomatica*, near Port Augusta. — P.S. Short 3662 & K. Watanabe.

glabrous. *Receptacle* hemispherical, glabrous. *Ray florets* female, 4–8; corolla 0.8–2.8 mm long, 0.3–1.4 mm wide, white. *Disc florets* bisexual, (3) 8–22, corolla tube 0.9–2.0 mm long, (4–) 5-lobed, yellow. *Stamens* (4) 5; anthers 0.33–0.54 mm long, microsporangia 0.29–0.46 mm long, apical appendages 0.016–0.06 mm long; pollen grains c. 230–548 per floret. *Style* c. 0.85–1.2 mm long, branches (0.25) 0.4–0.5 mm long. *Cypselas* in radial view somewhat obtriangular to widely obdeltate in outline, 2–2.8 mm long, 1.2–1.7 mm wide, straight, uniformly yellow brown or brown or discolorous, with the ab/adaxial ribs darker brown than the lateral margins, the entire fruit appearing minutely papillate at c.  $\times 50$  magnification; lateral margins (in radial view) swollen and slightly dilating towards the apex, entire, with a dense marginal vestiture of eglandular, long, white, silky hairs along their length, hairs c. 0.6–1.2 mm long, inconspicuously inrolled at apex, glandular hairs seemingly absent; base of fruit peg-like; pericarp internally with the swollen lateral surface consisting of large-celled parenchyma but with an inner, continual layer of sclerenchyma extending around the testa; vascular bundles seemingly 4 or more, always with 1 on each of the ab/adaxial margins and apparently smaller ones on each lateral surface; testa of thin-walled cells (P.S. Short 797). *Pappus* c. 0.9–1.2 mm long, of c. 12–18 white, scale-like elements several cells wide, always united and sometimes for c.  $\frac{1}{3}$  their length, but usually split to near the base. *Chromosome number*:  $n = 4$ . **Fig. 35.**

*Distribution.* Only known from western Eyre Peninsula, S.A., extending from about Coffin Bay in the south to Smoky Bay and Davenport Creek (near Ceduna) in the north, and extending no further inland than about 50 km.

I assume that Cleland's specimen from Davenport Creek and forming a part of Black's herbarium is from a locality a few kilometres to the west of Ceduna and not from the Gawler Ranges as indicated by Black's note.

*Habitat.* Collectors' notes indicate an affinity with alkaline soils, with P.S. Short 3742 from shallow loam in a paddock with surface limestone while specimens (P.S. Short 797 & 3738; Fig. 35) collected from the mainland coast opposite Eba Island were growing in calcareous sand over limestone and extending from shallow dunes into the margins of a samphire (*Tecticornia*) flat.

*Phenology and reproductive biology.* These short-lived plants are only recorded as flowering and fruiting in August and September.

*Brachyscome breviscapis* is a self-compatible species and although the pistillate ray florets are receptive for up to two days before the disc florets in the same capitulum reach anthesis it is predominantly inbreeding (e.g. Watanabe & Smith-White 1987). That this is the case is reflected by the comparatively small ray corollas and by pollen:ovule ratios. Thus, for seven capitula of P.S. Short 3738, the number of ray florets ranged from 6 to 8, the number of disc florets from 8 to 22, while the ray corollas were 1.5 to 2.5 mm long; estimates of pollen:ovule ratios from five of these capitula ranged from 158 to 258. Similar values were obtained from P.S. Short 3742; in the 14 capitula examined the number of ray florets ranged from 4 to 8, the number of disc florets from 3 to 16, and ray corollas were 0.8 to 2.8 mm long; estimates of pollen:ovule ratios determined from 13 of the capitula ranged from 123 to 381.

*Cytology.* Smith-White et al. (1970, Fig. 10) were the first to report  $n = 4$ ,  $2n = 8$  for this species, referring to it as *B. lineariloba* sp. D, the name also used by Smith-White & Carter (1970) when presenting the karyotype and accompanying data for this species; additional karyotypic information was also provided by Kyhos et al. (1977). Since its naming as *B. breviscapis*, Watanabe & Short (1992) have also confirmed the chromosome determination for this species and an idiogram of somatic chromosomes have been published in Watanabe & Smith-White (1987, Fig. 1) and Watanabe et al. (1999, Fig. 80).

The origin of the species as an amphidiploid has been discussed by Watanabe & Smith-White (1987) and Adachi et al. (1997).

**Notes.** I have not seen the holotype specimen of *B. breviscapis* but have no doubt as to the application of the name, having seen other specimens cited by Carter (1978c), including Carter 7040 & 7041, individually numbered plants gathered from what I assume is the same locality as the holotype.

For large specimens the presence of several mature capitula on scapes shorter than the leaves allows for ready identification of this species. However, it is sometimes difficult to distinguish it from small plants of *B. lineariloba*, particularly when dried and mounted, as for example some "bulk" collections by Carter from 30 miles south of Lock and from 14 miles NW of Elliston in which this species and *B. lineariloba* may be mounted on the one sheet.

On the two occasions I have seen both species growing together it was apparent that specimens of *B. breviscapis* (P.S. Short 797, P.S. Short 3738) had more succulent leaves than *B. lineariloba* (cytodeme E, P.S. Short 796, P.S. Short 3737) and that all, or almost all, the leaves were entire. In neighbouring plants of *B. lineariloba* the leaves were not only less succulent but mostly several-lobed; on the few occasions when the leaves were entire the mature scapes on each plant of *B. lineariloba* were manifestly longer than the leaves.

Kyhos et al. (1977) recorded that *B. lineariloba* cytodeme E has always been found at all known localities of *B. breviscapis*. If bisexual florets are present and there is doubt as to the identification of the two taxa then, as well as these features, cytodeme E can be distinguished from *B. breviscapis* by the fact that it displays 50% pollen sterility.

#### *Selected specimens examined.*

SOUTH AUSTRALIA: 6 miles S of Elliston, 25 Aug. 1970, C.R. Carter 7040–7041 (NSW); c. 19 km from Streaky Bay along Ceduna road, opposite Eba Is., 30 Aug. 1989, P.S. Short 3738 (MEL, TNS); 4.5 km E. of intersection of Elliston–Lock road with Mt Wedge–Colton road, 31 Aug. 1989, P.S. Short 3742 (AD, MEL).

#### 45. *Brachyscome campylocarpa* J.M.Black

Trans & Proc. Roy. Soc. South Australia 52: 228 (1928) ("Brachycome"); J.M.Black, Fl. S. Austral. 585 (1929) ("Brachycome"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 171, Fig. 22, 33, 34, pl. vi, map 12 (1948) ("Brachycome"), p.p., excluding *B. smithwhitei* & *B. watanabei*; E.L.Robertson, J.M.Black's Fl. S. Austral. 855, Fig. 1152Q (1965, rev. edn) ("Brachycome"), excl. reference to N.S.W. specimens; D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1448, Fig. 654D (1986) ("Brachycome"); E.Salkin et al., Austral. Brachyscomes 58 (1995). — **Type citation:** "Minnie Downs (near Diamantina River), coll. L. Reese." **Lectotype citation:** "Minnie Downs, Diamantina [sic], 'Flooded plains, 6–9 in. high', 8.1926, L. Reese [sic] (JMB). *Lectoparatype:* L.c. (MEL)." (Davis 1948, p. 171). **Lectotype:** Minnie Downs (Diamantina Riv.) Aug. 1926, L. Reese (AD 98403198 ex

herb. J.M.Black, p.p., excluding Reese material collected in 1931). **Isolectotypes:** K 000882187, MEL 220864.

*Brachyscome campylocarpa* sp. B: Smith-White et al., Austral. J. Bot. 18: 99–125. (1970) ("Brachycome").

Annual herb with stems ascending to erect, 4–35 cm or more long, green or reddish, glabrous except for long-septate hairs in leaf axis. *Leaves* basal and cauline, alternate, slightly dilated and sheathing at the base, mostly glabrous but with long, whitish, septate, cottony, hairs on the dilated base, sometimes extending along the main leaf axis; may also have scattered, stalked, glandular hairs on young leaves; first-formed and (in small plants) sometimes all leaves linear and entire, c. 10–35 mm long, 0.2–1.0 mm wide but usually many and sometimes all leaves still attached to large plants pinnatisect; pinnatisect leaves 10–50 (95) mm long, with a total of (3) 4–9 often irregular (not strictly paired) lateral lobes; lateral lobes oblong to linear, 1.2–11 mm long, 0.4–0.9 mm wide, lower ones about the same length to manifestly shorter than upper lobes. *Peduncles* extending well above the uppermost leaves, glabrous. *Involucre* c. 4–10 mm diam. *Bracts* 7–13, overlapping, obovate to elliptic, 3.3–5.4 mm long, 2.1–3.6 mm wide, thinly herbaceous but with mainly entire, scarious, whitish or sometimes very pale purplish apices and margins, glabrous. *Receptacle* seemingly hemispherical at flowering but subconical when mature, areolate, glabrous. *Ray florets* female, c. 5–15; corolla c. 6.7–7.4 mm long, 2–2.5 mm wide, apically entire or barely and minutely 2-toothed, 4-veined, white. *Disc florets* bisexual, c. 100 in large capitula but in depauperate plants perhaps fewer than 10, corolla tube c. 1.7–2.1 mm long, 5-lobed, yellow. *Stamens* 5; anthers c. 1.1–1.3 mm long, microsporangia c. 0.8–1 mm long, apical appendages c. 0.3 mm long, endothecial tissue radial, filament collar basally not thicker than filament. *Style* 2.35–2.65 mm long, arms 0.75–0.8 mm long, stigmatic part 0.45–0.52 mm long, sterile apical appendage deltate in outline, 0.28–0.32 mm long. *Cypselas* 2.1–3 mm long, 1.3–1.5 mm wide, curved, lateral margins narrow at base but manifestly dilating towards apex, wing-like, cypselas entirely or mostly dark brown-black except for the peg-like base and near the apex which is often pale brown; ab/adaxial ribs 0.3–0.4 mm wide; lateral margins (in radial view) may be somewhat swollen in basal half but generally not so in wing-like upper part 0.4–0.6 mm wide, at least the lower margins divided to c. ½ to ⅔ the way to the ab/adaxial rib, forming c. 2–7 teeth, upper margins entire or with 1–several shallow teeth, margins with 1 or more eglandular, white or very pale yellowish hairs, hairs c. 0.16–0.3 mm long, inconspicuously inrolled at apex, glandular hairs seemingly absent; pericarp internally with the swollen lateral surface consisting of large-celled parenchyma but with an inner, continual layer of sclerenchyma extending around the testa; vascular bundles 4 or more, always with 1 on each of the ab/adaxial margins and apparently smaller ones on each lateral surface; testa of thin-walled cells

(*R. Filson* 3305); base of cypselas peg-like and lacking an annular carpopodium. *Pappus* of c. 15–20, shortly basally connate, smooth bristles c. 0.16–0.9 mm long, white. *Chromosome number*:  $n = 5$ . **Fig. 4A, B, 10G.**

**Distribution.** Central and northern South Australia (east of c. 135°E and north of c. 31°S, and south-western Queensland, being very similar in its distribution to *B. eriogona*).

**Habitat.** The few collectors' notes suggest that *B. campylocarpa* is usually found on clay-pans, the margins of swamps and on flood and gibber plains with other herbs and forbs, growing in clay and sandy clay. However, there are also records of it growing in the swales of sand dunes (*J.Z. Weber* 5710).

**Phenology and reproductive biology.** Flowering and fruiting has been recorded from June to October. A pollen:ovule ratio of 3,941 was determined from *N. Donner* 3631, the capitulum examined having 13 ray florets and 107 disc florets.

**Cytology.** Smith-White et al. (1970, Fig. 24, 39, as "*B. campylocarpa* sp. B") recorded  $n = 5$ ,  $2n = 10$  for specimens from William Creek, S.A. An idiogram of somatic metaphase chromosomes is presented in Watanabe et al. (1996a, Fig. 26) and Watanabe et al. (1999, Fig. 57).

**Typification.** When designating the lectotype specimen and recording its presence in J.M. Black's herbarium (AD 98403198), Davis (1948) gave no description of the specimen; nor did she clearly indicate that a further specimen collected by Reese in 1931 is mounted on the same sheet. Her annotated label – "Lectotype (G.L.D.)" – is appropriately placed next to a single branchlet terminating in a mature capitulum and annotated by Black as "Minnie Downs (Diamantina Riv.) Aug. 1926 (L. Reese) ...". From Black's original description it is apparent that the fruit mounted in the upper part of the sheet and accompanied by his drawings and notes must also form part of this original gathering and be considered to form part of the lectotype specimen. Some, possibly all, of the additional plant material mounted on the sheet is from Reese's collection of 1931 and, contrary to Cooke's annotation, has no type status.

#### *Selected specimens examined.*

**SOUTH AUSTRALIA:** 2 km SE of Anna Creek, 16 km W of William Creek, 2 June 1984, *F.J. Badman* 1134 (AD, CANB); 4 km NE of Tirrawarra Swamp, 11 Sept. 1987, *J. Reid* 1152 (AD); c. 20 km SE of Curdimurka, 3 Oct. 1978, *J.Z. Weber* 5710 (AD).

**QUEENSLAND:** Simpson Desert, between 20–45 km NW of Birdsville, 25 July 1981, *P. Copley* 831 (AD).

#### **46. *Brachyscome dichromosomatica* C.R.Carter**

Telopea 1: 391 (16 Nov. 1978) ("*Brachycome*"); D.A. Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1451, Fig. 655B (1986) ("*Brachycome*"); J.Everett in G.J.Harden, Fl. New South Wales 3: 164 (1992) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 92 (1995). — **Type citation:**

"HOLOTYPE: 15 km NW. of Port Augusta, S.A. (originally labelled '9 m N. of P.A.'). *S. Smith-White and C.R. Carter* 2339, 25.viii.1968 (NSW)." **Holotype:** NSW 224102.

*Brachyscome lineariloba* sp. A (or race A): Smith-White et al., Austral. J. Bot. 18: 99–125 (1970) ("*Brachycome*"); Smith-White & C.R.Carter, Chromosoma (Berl.) 30: 129–153 (1970) ("*Brachycome*"); C.R.Carter & Smith-White, Chromosoma (Berl.) 39: 361–379 (1972) ("*Brachycome*"); C.R.Carter, Smith-White & Kyhos, Chromosoma (Berl.) 44: 439–456 (1974) ("*Brachycome*"); K.Watan., C.R.Carter & Smith-White, Chromosoma (Berl.) 52: 383–397 (1975) ("*Brachycome*"); K.Watan., C.R.Carter & Smith-White, Chromosoma (Berl.) 57: 319–331 (1976) ("*Brachycome*"); Kyhos, C.R.Carter & Smith-White, Chromosoma (Berl.) 65: 81–101 (1977) ("*Brachycome*"), as race A.

[*Brachyscome pachyptera* auct. non Turcz.: J.M.Black, Fl. S. Austral. 4: 583 (1929) ("*Brachycome*"), p.p.]

[*Brachyscome lineariloba* auct. non (DC.) Druce: G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 167, Fig. 21, 31, pl. viii (1948) ("*Brachycome*"), p.p.; E.L. Robertson, J.M.Black's Fl. S. Austral., 852 (1965, rev. edn), ("*Brachycome*"), p.p.]

Annual herb, ascending to erect, c. 6–30 cm tall, mostly glabrous except for hairs on leaves. *Leaves* basal and cauline (not in a rosette), held erect when fresh and slightly succulent, first-formed entire, but most leaves 1-pinnatisect, 1.5–10 cm long, glabrous or with mostly occasional scattered, long-septate whitish eglandular hairs and sometimes a few shortly-stalked glandular hairs; lobes (1) 2–8, opposite or irregular, oblong to linear or somewhat oblanceolate, (1) 5–20 mm long, (0.2) 1–2 mm wide, obtuse. *Peduncles* extending well above the uppermost leaves. *Involucre* 4.5–10 mm diam. *Bracts* 6–16, overlapping, narrowly to widely elliptic, obovate, ovate or somewhat oblong, (2.3) 3–5.3 mm long, 1.4–4.0 mm wide, mainly thinly herbaceous and greenish but the upper slightly scarious margins narrowly white or purplish, glabrous. *Receptacle* subconical, glabrous, shortly alveolate (i.e. honey-combed but ridges not high). *Ray florets* female, 8–16; corolla 6.0–14.0 mm long, 1.6–3.65 mm wide, veins 4 or 5, entirely pale blue or mauve or white above and pale mauve below or entirely white. *Disc florets* bisexual, 33–107, corolla tube 1.7–3.1 mm long, 5-lobed, yellow or lobes greenish. *Stamens* 5; anthers 0.98–1.48 mm long, microsporangia 0.65–1.28 mm long, apical appendages 0.16–0.34 (0.54) mm long; pollen grains c. 4,100–8,600 per floret. *Style* c. 1.33–2.36 mm long, branches 0.69–1.18 mm long. *Cypselas* in radial view appearing somewhat narrowly oblong or oblanceolate in outline, 2.6–3.5 mm long, 0.65–1.4 mm wide, straight, ± uniformly pale brown or yellow-brown, apex sometimes darker brown or purplish brown or somewhat discoloured, ab/adaxial margins darker than lateral margins, or very rarely the entire fruit greenish, at least the ab/adaxial margins sometimes appearing minutely papillate at c. ×50 magnification; lateral margins swollen, entire, with a dense marginal vestiture of eglandular, long, white, silky hairs along their length, hairs to c. 1 mm long and inconspicuously inrolled at

apex, glandular hairs seemingly absent; base of fruit peg-like; pericarp internally with the swollen lateral surface consisting of large-celled parenchyma but with an inner, continual, wide layer of sclerenchyma extending around the testa; vascular bundles perhaps 6, always with 1 on each of the ab/adaxial margins and apparently smaller ones on each lateral surface; testa of thin-walled cells (*P.S. Short* 3668). *Pappus* c. 1 mm long, of c. 20 or more white, somewhat unequal, scale-like elements several cells wide, with divided margins; elements united for less than c.  $\frac{1}{2}$  their length, often splitting to near the base. *Chromosome number*:  $n = 2 + 0-3$  macroBs. **Fig. 36.**

*Distribution.* Flinders Range–Lake Torrens region of S.A. and the vicinity of Wilcannia, N.S.W.

*Habitat.* A species of arid-zone low shrubland often dominated by chenopods, and herbfields, frequently on red-brown clay loam or compact loam.

*Phenology and reproductive biology.* A self-incompatible, outbreeding species (e.g. Watanabe & Smith-White 1987) for which pollen:ovule ratios ranging from 3,183 to 7,546 were determined for 11 capitula from different plants of var. *dichromosomatica* (*P.S. Short* 3761; reported in Watanabe et al. 1991). Values ranging from 3,555 to 4,490 have since been determined for five plants of *P.S. Short* 3637, which is referable to var. *alba*.

Flowering and fruiting time is somewhat rainfall-dependent, with flowering recorded, for example, in late April, but mostly flowering and fruiting around August–October.

*Cytology.* When Carter (1978c) formally named and described *B. dichromosomatica*, there were four different chromosomal races or cytodesmes recognised. Three of these (A<sub>1</sub>, A<sub>2</sub> and A<sub>4</sub>) he placed in var. *dichromosomatica*, and one, A<sub>3</sub>, was referred to as var. *alba*. Watanabe et al. (1975) subsequently recognised that variant karyotypes can be distinguished within these cytodesmes, including six in cytodesme A<sub>1</sub>.

Idiograms of prometaphase and/or metaphase somatic chromosomes, of the chromosomal races of *B. dichromosomatica* have been published in many articles: Smith-White & Carter 1970, Fig. 33, of A<sub>1</sub>, A<sub>2</sub> & A<sub>3</sub>), Watanabe et al. (1975, Fig. 25, A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub> & A<sub>4</sub>), Watanabe et al. (1991, Fig. 14, 17, of A<sub>1</sub> variant I), Adachi et al. (1997, Fig. 10–12, of A<sub>1</sub>, A<sub>2</sub> & A<sub>3</sub>), Watanabe et al. (1999, Fig. 75–79, of A<sub>1</sub>, A<sub>1</sub> variant I, A<sub>2</sub>, A<sub>3</sub>, & A<sub>4</sub>).

Gould (1979) recorded “phenotypically abnormal plants”, one with minute leaves, the other with “compoundly pinnatisect” leaves, for plants with a normal diploid karyotype of plants referable to the race (cytodesme) A<sub>2</sub>.

Carter & Smith-White (1972) published a paper concerning the accessory, or B chromosomes (Bs), in *B. dichromosomatica* (as *B. lineariloba* sp. A), noting that there are Bs of two sizes: macro or larger Bs which are c. 4.0  $\mu$  long and usually somatically stable, and micro

or smaller Bs less than 1.0  $\mu$  long and which are less common and display extreme irregularity in both meiotic and somatic behaviour. These workers noted that a lack of pairing affinity between the A and B chromosomes indicated that the macro-Bs are not derived from the As and that hybridisation between *B. dichromosomatica* and other members of the *B. lineariloba* complex may be a source of the macro-Bs. Carter (1978b) subsequently published on the inheritance, frequency and distribution of B chromosomes in this species. More recently, molecular analyses of the B chromosomes confirmed that none of the Bs have originated by simple excision from A chromosomes, evidence suggesting that the macro- (or standard) Bs of *B. dichromosomatica* may be derived from a taxon known as *B. lineariloba* C ( $2n = 16$ ) (Leach et al. 2004, and papers referred to therein).

*Notes.* Greenish cypselas, the colour perhaps due to substrate, are sometimes observed.

Carter (1978c) recognised two varieties based on the colour of the ray corolla.

#### Key to varieties of *B. dichromosomatica*

1. Ray corolla white ..... 46b var. *alba*
- 1: Ray corolla pale blue or mauve, at least on the under-surface (Fig. 36) ..... 46a var. *dichromosomatica*

#### 46a. *Brachyscome dichromosomatica* var. *dichromosomatica*

D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1451, Fig. 655B (1986) (“*Brachycome*”); E.Salkin et al., Austral. Brachyscomes 92 (1995).

*Brachyscome lineariloba* sp. A (or race A), cytodesmes A<sub>1</sub>, A<sub>2</sub> & A<sub>3</sub>; Smith-White & C.R.Carter, Chromosoma (Berl.) 30: 129–153 (1970) (“*Brachycome*”); C.R.Carter & Smith-White, Chromosoma (Berl.) 39: 361–379 (1972) (“*Brachycome*”); K.Watan., C.R.Carter & Smith-White, Chromosoma (Berl.) 52: 383–397 (1975, first reference to A<sub>1</sub>) (“*Brachycome*”); K.Watan., C.R.Carter & Smith-White, Chromosoma (Berl.) 57: 319–331 (1976) (“*Brachycome*”); Kyhos, C.R.Carter & Smith-White, Chromosoma (Berl.) 65: 81–101 (1977) (“*Brachycome*”).

Ray corolla mid- to pale blue, at least on the underside. **Fig. 36.**

*Distribution.* Flinders Range–Lake Torrens region of S.A.

*Cytology.* Smith-White & Carter (1970) and Watanabe et al. (1975) recognised three cytodesmes A<sub>1</sub>, A<sub>2</sub> & A<sub>4</sub> in var. *dichromosomatica*.

#### Selected specimens examined.

SOUTH AUSTRALIA: c. 6 km from Lincoln Gap on Iron Knob road, 30 Aug. 1968, *B. Copley* 2024 (AD); between Hawker & Parachilna, near Mern Merna Rlwy Stn, 26 Sept. 1956, *H. Eichler* 13034 (AD); 16 km NW of Port Augusta, 25 Aug. 1989, *P.S. Short* 3662 & *K. Watanabe* (AD, CANB, MEL, PERTH, TNS); Flinders Ranges, Wild Dog Glen region, 12–17 km N of Simmonston along road to Yappala Hmsd, 2 Sept. 1989, *P.S. Short* 3761 & *K. Watanabe* (AD, CANB, MEL, NSW, PERTH, TNS); Windy Hill, Hawker, 30 July 1968, *G.F. Telfer* 11 (AD).

#### 46b. *Brachyscome dichromosomatica* var. *alba* C.R.Carter

Telopea 1: 392 (1978) ("*Brachycome*"); J.Everett in G.J. Harden, Fl. New South Wales 3: 164 (1992) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 174 (1995). — **Type citation**: "HOLOTYPE: 120 miles W. of Cobar (90 km E. of Wilcannia), New South Wales, S. Smith-White and C.R. Carter 4247, 2.vii.1969 (NSW)." Not seen.

*Brachyscome lineariloba* sp. A (or race A), cytodeme A.; Smith-White & C.R.Carter, Chromosoma (Berl.) 30: 129–153 (1970) ("*Brachycome*"); C.R.Carter & Smith-White, Chromosoma (Berl.) 39: 361–379 (1972) ("*Brachycome*"); K.Watan., C.R.Carter & Smith-White, Chromosoma (Berl.) 52: 383–397 (1975) ("*Brachycome*"); K.Watan., C.R.Carter & Smith-White, Chromosoma (Berl.) 57: 319–331 (1976) ("*Brachycome*"); Kyhos, C.R.Carter & Smith-White, Chromosoma (Berl.) 65: 81–101 (1977) ("*Brachycome*").

Ray corolla always white.

**Distribution.** New South Wales. Apparently a taxon associated with herbfields and low shrubland associated with the lower Darling River floodplain. Most specimens, collected in relation to cytological studies by Smith-White and his colleagues, come from between Tilpa and Wilcannia but it is also known from near Lake Cawndilla (near Menindee) and c. 10 km N of Wentworth.

**Cytology.** This variety is equivalent to the chromosomal race of *B. dichromosomatica* recognised by Smith-White & Carter (1970) as cytodeme A3.

**Notes.** I have not seen the holotype specimen of *B. dichromosomatica* var. *alba* but having examined other specimens cited by Carter (1978c) or determined by him to be of this species, including *C.R. Carter 4248* (NSW 224076) which was collected from the same locality as the holotype, I have no doubt as to the application of the name.

#### *Specimens examined.*

NEW SOUTH WALES: 50 miles E of Wilcannia on Cobar road, 20 July 1960, *N.T. Burbidge 6620* p.p. (CANB, NSW, both mixed with *B. lineariloba*); between Lake Tandou and Lake Cawndilla, 22 July 1960, *N.T. Burbidge 6627*. (CANB); 3 miles W of Tilpa, 19 Aug. 1968, *C.R. Carter 2110* (CANB), *2111* (AD), *2112* (AD), *2117* (as Anon., SYD); 56 miles E of Wilcannia, July 1970, *C.R. Carter 6547–6550* (PERTH); 10 km N of Wentworth on Silver City Hwy, floodplain of River Darling, 31 Aug. 1978, *B. Copley 5233* (AD); Wongalara, 55 miles E of Wilcannia, 20 Aug. 1968, *C.W.E. Moore 5366* (CANB 187647); 16 km N of Barrier Hwy along road to Tilpa, 20 Aug. 1989, *P.S. Short 3637* (MEL, NSW, TNS); 120 miles W of Cobar, 2 July 1969, *S. Smith-White & C. Carter 4248* (NSW), *4265* (SYD), *4266* (SYD), *4271–4273* (SYD), *4274 & 4275* (AD), *4276* (SYD), *4277 & 4278* (AD); *4279–4284* (SYD), *4291–4293* (PERTH), *4294–4299* (SYD); 2.8 miles W of Tilpa (120 miles W of Cobar), 2 July 1969, *S. Smith-White & C. Carter 4300–4315* (SYD); 45 miles E of Wilcannia, 6 July 1969, *S. Smith-White & C. Carter 4342 & 4343* (AD), *4344 & 4345* (NSW), *4346 & 4347* (CANB); *4348–4351* (SYD); Darling River, 1889, *Miss Urquhart* (MEL 116117); 27 km S of Tilpa/Wilcannia road along Boden Park/Ivanhoe road, 2 Oct. 1992, *K. Watanabe 51* (MEL, NSW, TI).

#### 47. *Brachyscome eriogona* (J.M.Black) G.L.R.Davis

Proc. Linn. Soc. New South Wales 73: 205, Fig. 74, 81, pl. vi, map 24 (1948) ("*Brachycome*"); E.L.Robertson, J.M.Black's Fl. S. Austral. 852, Fig. 1152D (1965, rev. edn) ("*Brachycome*"); Jessop, Fl. Centr. Austral. 369, Fig. 468C (1981) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1451, Fig. 655D (1986) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 106 (1995) ("*Brachycome*"). — *Brachyscome goniocarpa* var. *eriogona* J.M.Black, Trans. & Proc. Roy. Soc. South Australia 52: 228 (1928) ("*Brachycome*"); J.M.Black, Fl. S. Austral. 1st ed. 583 (1929) ("*Brachycome*"). — **Type citation**: "Near Lake Frome, coll. S. A. White." **Holotype**: near Lake Frome, Dec. 1920, *S.A. White* (AD 96345096, ex herb. J.M. Black). **Isotype**: K 000882292.

*Brachyscome campylocarpa* sp. A: Smith-White et al., Austral. J. Bot. 18: 99–125. (1970) ("*Brachycome*").

Annual herb with stems ascending to erect, c. 6–30 cm or more long, glabrous except for long-septate hairs in leaf axis. *Leaves* basal and cauline, alternate, slightly dilated and sheathing at the base, glabrous or with long, whitish, septate, cottony, intertwined hairs at the base; first-formed, and in small plants, sometimes all leaves linear, entire, c. 10–80 mm long, 0.7–1.0 mm wide but usually many leaves 1-pinnatisect; pinnatisect leaves to c. 75 mm long, with 2–8 mostly irregular (not strictly paired) lobes, lobes mostly linear or sublinear or if short then oblong, (2) 5–21 mm long, (0.2) 0.5–1.9 mm wide. *Peduncles* extending well above the uppermost leaves. *Involute* 4.5–9.8 mm diam. *Bracts* 8–16, overlapping, elliptic, widely obovate to obovate or very widely ovate to ovate, 2.4–6.2 mm long, 1.3–4.1 mm wide, mainly herbaceous but with entire, scarious, whitish apices and margins, glabrous. *Receptacle* hemispherical to subconical at maturity, areolate, glabrous. *Ray florets* female, 10–19; corolla 5.5–12 mm long, 1.1–3.5 mm wide, only or mostly white when mature but sometimes tinged mauve on lower surface, when immature at least sometimes pale mauve. *Disc florets* bisexual, 57–152, corolla tube 2.1–3 mm long, 0.8–1.3 mm diam., 5-lobed, yellow. *Stamens* 5; anthers (0.99) 1.25–1.6 mm long, microsporangia (0.89) 1–1.33 mm long, apical appendages (0.2) 0.24–0.44 mm long. *Style* 1.04–2.18 mm long, branches 0.75–1.12 mm long. *Cypselas* 1.7–2.5 mm long, 0.9–1.35 mm wide, curved, at maturity usually uniformly pale to very dark brown except basally; ab/adaxial ribs 0.2–0.4 mm wide; lateral margins (in radial view) 0.3–0.5 mm wide, somewhat swollen and gradually dilating towards apex, usually entire, rarely with 1 or 2 very shallow teeth, with eglandular, white or yellowish hairs along their length, hairs 0.5–0.7 mm long, inconspicuously inrolled at apex, glandular hairs seemingly absent; pericarp internally with the swollen lateral surface consisting of large-celled parenchyma but with an inner, continual layer of sclerenchyma extending around the testa; vascular bundles 4 or more, always with 1 on each of the ab/adaxial margins and apparently smaller ones on each lateral surface; testa of thin-walled cells (*P.S. Short 3121*); base of fruit peg-like, whitish, lacking an annular carpopodium. *Pappus*



of c. 25–30, basally connate, smooth bristles c. 0.35–0.9 mm long, white or yellowish. *Chromosome number*:  $n = 4$ . **Fig. 4C, D, 10H, 11A.**

*Distribution.* Central and northern South Australia (east of c. 134°E and north of c. 32°S but avoiding the Simpson Desert), south-western Queensland and the extreme north-west of New South Wales, a distribution similar to that of *B. campylocarpa*.

*Habitat.* Commonly in depressions on both gibber plains and low chenopod shrubland (steppe) but also recorded from creek-washouts and, in Queensland, there is a record of it growing in a lignum swamp. Recorded as growing in clay, silty clay, loam and micaceous silts.

*Phenology and reproductive biology.* Flowering is mostly from about July to September, with fruiting from late July to October but fruiting specimens have been collected in March and June, a reflection no doubt of the irregularity of rainfall in central Australia.

Pollen:ovule ratios ranging from 1,917 to 4,620 were determined for this species, data being recorded for nine capitula, these taken from three populations (*P.S. Short* 3121, 3684 and 3687).

*Cytology.* Chromosome number determinations of  $n = 4$  and  $2n = 8$  have been recorded for this species by Smith-White et al. 1970, Fig. 23 & 38, as “*B. campylocarpa* sp. A”) and Watanabe & Short (1992). Watanabe et al. (1996a, Fig. 27), Adachi et al. (1997, Fig. 17) and Watanabe et al. (1999, Fig. 62) have presented idiograms of the species.

*Typification.* Davis (1948, p. 205) referred to a holotype and a paratype specimens of the name *Brachyscome goniocarpa* var. *erigona* J.M.Black as being in Black’s herbarium, and annotated one element as “lectotype”, and another as “paratype”. One of these elements consists of a single plant which is mounted on a white sheet and contained within a cellophane bag, pinned to the larger herbarium sheet (AD 96345096); it is the element labelled “lectotype” by Davis. The other element, labelled “paratype” by Davis, is similarly in a cellophane bag and consists of a pale greenish card to which is attached a single branchlet and dissected florets, including fruit, and upon which Black has illustrated florets and fruit and pencilled descriptive notes. Both elements are annotated with the same collection details and are from Black’s own herbarium and there is no question that they constitute type material but the separation of the two elements and the use of differently coloured card may suggest that they should not be considered to be part of the same specimen. However, the annotation accompanying the uppermost element on the sheet (the single plant) clearly links it with the lower element containing the illustrations, i.e. Black wrote “near Lake Frome Dec. 1920 (S.A. White), see drawing.” I consider this statement to satisfy the requirements of Article 8.3 that for different elements to be considered to constitute the same specimen they

must be “clearly labelled as being part of that same specimen”. For these reasons I consider both elements to constitute the holotype specimen of the name *Brachyscome goniocarpa* var. *erigona* J.M.Black.

There is an isotype specimen at K which is annotated as “*Brachyscome goniocarpa* Sond et F.v.M. ? var. *erigona*, J.M. Black” in Black’s hand and consists of a small, leafy branch and two fruiting capitula.

#### *Selected specimens examined.*

SOUTH AUSTRALIA: Yarra Wurta Dam, Mulgaria Station, 25 June 1989, *F.J. Badman* 2883 (AD); 3 km S of Pimba, 25 Aug. 1989, *P.S. Short* 3669 & *K. Watanabe* (AD, E, MEL, PERTH, TNS); c. 0.5 km N of Arkaringa Creek along Coober Pedy to Oodnadatta road, 27 Aug. 1989, *P.S. Short* 3693 & *K. Watanabe* (AD, CANB, E, MEL, TNS).

QUEENSLAND: c. 60 miles NE of Noccundra, 22 Aug. 1964, *R.C. Carolin* 4309 (SYD); c. 2.5 km SW of Nappa-Merrie Stn, 18 Aug. 1968, *R.H. Kuchel* 2575 (AD).

NEW SOUTH WALES: Mt King Bore. 21 km S of Olive Downs Hmsd, 2 Sept. 1989, *R.G. Coveny* 13464 (AD n.v., BRI n.v., CBG n.v., K n.v., MEL, NSW n.v., PERTH n.v.); Wittabrenna Creek valley 18 road-km E of Silver City Hwy (NE of Tibooburra), 6 Sept. 1981, *W. Greuter* 18475 (MEL, NSW).

#### **48. *Brachyscome lineariloba* (DC.) Druce**

Rep. Bot. Exch. Cl. Brit. Isles, Suppl. 2: 610 (1917) (“*Brachyscome*”); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 167, Fig. 21, 31, pl. viii no. 1 (1948) (“*Brachyscome*”), p.p., excl. *B. breviscapis* & *B. dichromosomatica*; E.L.Robertson, J.M. Black’s Fl. S. Austral., 852, Fig. 1152E (1965, rev. edn) (“*Brachyscome*”), excl. *B. breviscapis* and *B. dichromosomatica*; J.H.Willis, Handb. Pl. Victoria 2: 666 (1973) (“*Brachyscome*”); C.R.Carter, Telopea 1: 390 (1978) (“*Brachyscome*”); G.M.Cunningham et al., Pl. W. New South Wales 647, ?Fig. 64d (1981) (“*Brachyscome*”); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1454, Fig. 656D (1986) (“*Brachyscome*”); J.Everett in G.J.Harden, Fl. New South Wales 3: 164 (1992) (“*Brachyscome*”); E.Salkin et al., Austral. Brachyscomes 138 (1995); P.S.Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 849, Fig. 171f (1999). — *Steiroglossa lineariloba* DC., Prodr. 6: 39 (Jan. 1838). — **Type citation:** “in Novae-Hollandiae interioris planitiebus humidis ad Lachlan-river julio flor. legit. cl. A. Cunningham. (v.s. comm. a cl. inv.)” **Lectotype:** Wet plains, Lachlan R., 29 July 1817, *A. Cunningham* (G-DC). (Davis 1948, p. 167, pl. viii, no. 1). **Remaining syntypes:** Molle’s Plains, Lachlan River, Interior of N.S.Wales, 10 July 1817, *A. Cunningham* (G-DC); Molle’s Plains on the Lachlan River, 10 July 1817, *A. Cunningham* (K 000882192, presented by Heward); Molle’s Plains (K 000882191, two immature plants with the locality but no other information).

*Brachyscome pachyptera* Turcz., Bull. Soc. Imp. Naturalistes Moscou 24(1): 175 (March 1851) (“*Brachyscome*”); J.M.Black, Fl. S. Austral. 4: 583 (30 June 1929) (“*Brachyscome*”), p.p., excluding *B. breviscapis* and *B. dichromosomatica*. — **Type citation:** “Nova Hollandia. Drum. IV. n. 205.” **Holotype:** KW n.v. **Isotypes:** G 00222783 (per JSTOR), K 000882190, K 000882188, MEL, TCD, W. **Possible isotype:** Drummond (K 000882189).

Annual *herb*, with decumbent to erect stems 2–16 cm long, mostly glabrous but some scattered, broad, septate, eglandular hairs often present. *Leaves* only basal or near-basal, linear, entire, or 1-pinnatisect, 1–8 cm long, pinnatisect leaves with 3–9 opposite or irregularly spaced somewhat oblong to linear lobes 1–15 mm long, 0.4–2 mm wide; all leaves subglabrous but some broad, septate, eglandular hairs usually present, leaves often slightly succulent. *Peduncles* extending well above the uppermost leaves. *Involute* 2.2–6.4 mm diam. at anthesis but to c. 12 mm diam. when fruit mature. *Bracts* 5–14, obovate to very widely obovate or ovate or narrowly to widely elliptic or somewhat oblong, 2.3–6.8 mm long, 1.0–4.3 mm wide, mainly herbaceous but with scarious, often purplish margins, glabrous. *Receptacle* hemispherical to subconical, somewhat areolate (i.e. distinctly but shallowly honey-combed), glabrous. *Ray florets* 4–14, corolla 1.8–7.2 mm long, 0.6–1.7 mm wide, white. *Disc florets* (2) 5–35; corolla tube 0.8–2.3 mm long, (4-) 5-lobed, yellow. *Stamens* (4) 5; anthers 0.34–0.72 mm long, microsporangia 0.31–0.67 mm long, apical appendages 0.02–0.16 mm long; pollen grains c. 240–1,000 per floret, with 50% sterility in cytodeme E. *Style* c. 0.9–1.67 mm long; branches 0.44–0.74 mm long, sterile appendage widely deltate, shorter than stigmatic part. *Cypselas* somewhat obtriangular (ab/adaxial view), straight, 2.1–4.2 mm long, 1.2–2.6 mm wide, ab/adaxial ribs 0.2–0.4 mm wide, each lateral surface consisting of a single, variably swollen, smooth, entire ridge extending the length of the fruit, with a dense, usually unbroken line of c. 2 mm long, eglandular, biseriate, apically-curved silky white or somewhat golden hairs extending along the outer surface, sometimes the lateral surfaces poorly developed and swelling confined to near the apex, giving the appearance of apical shoulders, as much as the upper 1/3 of the ridges devoid of hairs; entire fruit yellow brown to dark brown, somewhat concolorous to markedly discolorous, with ab/adaxial margins often darker than lateral ridges, at least the ab/adaxial margins appearing minutely papillate at c.  $\times 50$  magnification; pericarp internally with the lateral surface consisting of large-celled parenchyma but with an inner, continual, layer of sclerenchyma extending around the testa; vascular bundles perhaps 6, with 1 on each of the ab/adaxial margins and seemingly 2 smaller ones on each lateral surface; testa of thin-walled cells (*P.S. Short* 1248, cytodeme C); carpodium absent, base peg-like. *Pappus* of c. 15 scale-like bristles, at least basally connate but sometimes more so (perhaps splitting with age), 1–1.3 mm long, erect, white. *Chromosome numbers*:  $2n = 12$  &  $16$ , somatic no.  $10$ . **Fig. 3K, 35.**

*Distribution.* Found in the southern half of the Australian mainland, from Western Australia to South Australia (including off-shore islands such as Masillon Is., Nuyts Archipelago), New South Wales and Victoria.

A specimen MEL 116150 appears to be of this species and the label indicates that it was collected by

Dr W.F. Wheeler between Stokes Range and Coopers Creek. This would have been during Howitt's search for Burke & Wills in 1861 (Willis 1962). If the specimen is correctly labelled then *B. lineariloba* also occurs in the extreme south-west of Queensland. However, I have seen no other specimens from Queensland, which suggests that the label is erroneous and that the specimen was collected further south. Populations of *B. lineariloba*, perhaps no more than c. 200 km away from the Stokes Range/Coopers Creek region, are known in both New South Wales and South Australia. Thus, on current knowledge, the presence of *B. lineariloba* in Queensland is questionable.

There is a specimen (MEL 116142) of *B. lineariloba* which is labelled as having been collected by W. Schwartz from Charlotte Waters in 1889, which places the species within the southern boundary of the Northern Territory. I consider this to be an erroneously labelled specimen, the most northerly distribution for the species in South Australia being about 28°S (e.g. *S.A. White*, AD 97803286 from Mungerania).

Distribution maps of *B. lineariloba* and its constituent cytodesmes in the eastern States and part of W.A. – as based on cytological data – are published in Smith-White & Carter (1970, Fig. 1), Carter et al. (1974, Fig. 1) and Kyhos et al. (1977, Fig. 28).

*Habitat.* Found in a diversity of habitats, e.g. in mallee eucalypt / *Callitris* woodland on sand dunes; chenopod shrubland on red-brown loam; *Melaleuca uncinata* community on deep brown-white sand; *Eucalyptus leucosylon* / *E. largiflorens* associations on the margins of swamps (in the Little Desert, Victoria); mallee eucalypt scrub with an understorey of *Melaleuca* and clumps of *Triodia*, in shallow loam over limestone; *Eucalyptus camaldulensis* / *E. largiflorens* woodland on heavy grey clay river flat; and, among samphire on the edge of a saline depression.

*Phenology and reproductive biology.* Plants are usually found flowering from about late July to late October.

The three cytodesmes (B, C & E) of *B. lineariloba* are self-compatible and, although the female ray florets are receptive for up to two days before anther dehiscence in disc florets of the same capitulum, are predominantly self-fertilising (e.g. Watanabe & Smith-White 1987). That this is the case, is reflected by their short ray florets (compared to *B. dichromosomatica*) and by pollen:ovule ratios determined for each cytodeme.

For cytodeme B, pollen:ovule ratios were determined for 30 capitula removed from plants belonging to four populations (*P.S. Short* 3710, 3725, 3729 & 3766). Values ranged from 145 to 499.

For cytodeme C, pollen:ovule ratios were determined for 38 capitula removed from plants belonging to four populations (*P.S. Short* 3625, 3647, 3653 & 3661), with computed values ranging from 128 to 613.

For cytodeme E, 30 capitula – 15 from each of two populations, *P.S. Short* 3737 (Fig. 35) & 3744 – were

examined. Pollen:ovule ratios were slightly lower than in the other cytodesmes, ranging from 72 to 347, this correlating with the 50% pollen sterility in this quasidiploid entity.

*Cytology.* Variable chromosome numbers within *B. lineariloba* s.lat. were first reported by Smith-White (1968) and subsequently by Turner (1970) and Smith-White et al. (1970). There have been many subsequent papers specifically concerned with *B. lineariloba* in which Smith-White & Carter (e.g. 1970) recognised five entities "A", "B", "C", "D" and "E" in order of their discovery and which have been subsequently referred to as species or, most commonly, cytodesmes. Carter (1978c) formally named cytodesme A and cytodesme D as *B. dichromosomatica* and *B. breviscapis* respectively, while B, C and E were maintained as cytodesmes within *B. lineariloba*.

Cytodesme B has  $2n = 12$ , cytodesme C has  $2n = 16$ , while the quasidiploid cytodesme E has a somatic number of 10.

The relationships of members of the *B. lineariloba* group have been the subject of much discussion; see for example Kyhos et al. (1977) and Watanabe & Smith-White (1987) and papers cited therein. Idiograms of cytodesmes B, C and E have been published in the references above and others such as Watanabe et al. (1999).

*Nomenclatural notes regarding Steiroglossa lineariloba.* Syntype specimens of the name *Steiroglossa lineariloba* DC. are all immature and none more so than the lectotype specimen chosen by Davis. In the lectotype the ray florets in the capitulum do not exceed the involucre and, with them being so young, the diagnostic characters of the cypselas are unavailable for examination. This is unfortunate as both *B. lineariloba*, as here-defined, and *B. smithwhitei* occur in the Lachlan River region. However, the habit of the single plant is more in keeping with that of *B. lineariloba* than *B. smithwhitei* and I believe it reasonable to continue applying the name *B. lineariloba* to the taxon under discussion. The remaining syntype specimen gathered on 10 July 1817 has slightly more mature capitula and with the immature fruit being straight, lacking any upper wing-development and having an apparent continual row of hairs along the lateral margins, display features characteristic of *B. lineariloba* as described here, not *B. smithwhitei*. Charles Fraser was on the same collecting expedition as Cunningham and, although we can't know whether it was collected from the same locality as the type, it is also apparent that his specimen at K ("*Fraser s.n. ... of Molle's Plains, observed in Flower in July*") is also of *B. lineariloba*.

*Nomenclatural notes regarding Brachyscome pachyptera.* Marchant (1990) recorded the presence of a type specimen of this name at KW. It is here considered to be the holotype specimen, there being no indication on duplicates that they were seen by Turczaninow.

*Notes.* Detailed measurements pertaining to floral characteristics have been made for all three cytodesmes, these being for the populations referred to above under reproductive biology; all such data is incorporated in the above description.

Carter recorded that

'Races' B, C and E cannot be distinguished morphologically (even from living material) by any character other than chromosome number, although there is an increase in average size [of plants] from E (the smallest) to B and C. There is, however, considerable overlap in size, and it cannot be used to discriminate effectively between the three 'races' which are treated as belonging to one species

Carter (1978c), p. 388

This statement was not completely accurate as it is possible to distinguish the quasidiploid cytodesme E on morphological grounds, albeit reliant on the examination of pollen grains. This entity is not a normal diploid, with the somatic complement consisting of a diploid set of four chromosomes plus a haploid set of two, non-homologous chromosomes, with the latter solely inherited via the pollen. At meiosis the univalents divide in the first division but lag at second anaphase and 50% of the resultant pollen grains are sterile. Thus, provided specimens are flowering, it is possible to identify cytodesme E. However, with the exception of *P.S. Short* 3737 & 3744 used for the measurement of floral characteristics and pollen:ovule ratios I have not attempted to do so.

Cypselas vary considerably in size; for example, some mature fruit are only 2.1 mm long while others are twice that length. The extent to which the lateral swollen surfaces develop is also variable with, for example, some fruit having comparatively prominent "shoulders" while in others the longitudinal swelling tapers gradually to the base; and while in many specimens the hairs on the longitudinal surfaces run the length of the fruit it is also noticeable that, in some, about the upper 1/3 of the length of the fruit may be devoid of hairs, e.g. *E. Canning* 4664 (CANB; specimen from N.S.W.). I have not made a concerted attempt at analysis, but my impression is that the recognition of additional taxa based on fruit differences is unlikely to be tenable within *B. lineariloba* s.lat.

#### *Representative specimens examined.*

WESTERN AUSTRALIA: c. 2 km NE of Vermin Proof Fence along Cleary to Paynes Find road, 16 Sept. 1990, *P.S. Short* 3819 (MEL, PERTH); c. 14 km SE of Marvel Loch, 24 Sept. 1993, *P.S. Short* 4047 (MEL); 4 miles W of Coolgardie, 15 Aug. 1965, *B.L. Turner* 5301 (MEL, PERTH).

SOUTH AUSTRALIA: White Dam, Andamooka Stn, 25 July 1989, *F.J. Badman* 3153 (AD); between Corny Point and Cape Spencer, 26 Sept. 1957, *H. Eichler* 13992 (AD); 22 km NE of Iron Knob, 29 Aug. 1989, *P.S. Short* 3710 (AD, CANB, MEL, TNS).

NEW SOUTH WALES: Wee Wattah Bore, Napunyah Station, 26 Oct. 1963, *E.F. Constable* 4639 (BRI, NSW); near Mt Robe, 29 Aug. 1981, *M.G. Corrick* (MEL, NSW); 8 km from Broken Hill to Tibooburra road along road to White Cliffs, 19 Aug. 1989, *P.S. Short* 3632 (MEL, NSW).

VICTORIA: Mitre Lake Flora & Fauna Reserve, 11 Nov. 1986, *A.C. Beauglehole 86524* (AD, MEL); 3.4 km SE of Mt Crozier, 9 Oct. 1990, *J.H. Ross 3414* (MEL); 200 m From S.A./Vic. border along Stuart Hwy, 4 Sept. 1989, *P.S. Short 3769* (AD, MEL, TNS).

#### 49. *Brachyscome smithwhitei* P.S.Short & K.Watan.

Austral. Syst. Bot. 6: 339, Fig. 4 & 5 (1993); E.Salkin et al., Austral. Brachyscomes 212 (1995). — **Holotype:** 7 km N of Barrington along main road to Cunnamulla, 28°57'S, 145°43'E. Herbfield with scattered box. Compact reddish-brown sandy loam. 15 Aug. 1989, *P.S. Short 3566* & K. Watanabe (MEL 695059). **Isotypes:** BRI, TNS.

*Brachyscome campylocarpa* (sp. C): Smith-White et al., Austral. J. Bot. 18: 103, Fig. 25 (1970) ("*Brachycome*").

*Brachyscome* sp. aff. *campylocarpa*: K.Watan. & P.S.Short, Muelleria 7: 458, 465, 466, Fig. 1F (1992).

*Brachyscome* sp. B: J.Everett in G.J.Harden, Fl. New South Wales 3: 165 (1992) ("*Brachycome*").

[*Brachyscome campylocarpa* auct. non. J.M.Black: G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 171 (1948) ("*Brachycome*"); G.M.Cunningham et al., Pl. W. New South Wales 648 (1981) ("*Brachycome*"), excluding Fig. 64e.]

Annual herb, stems to c. 40 cm long, ascending to erect, glabrous, green or purplish. *Leaves* basal and cauline, alternate, 1 (2) pinnatisect, to c. 15 cm long, dilated and sheathing at base, usually with long, septate cottony hairs basally, otherwise glabrous, or with scattered, short, septate glandular hairs; leaf segments mainly oblanceolate or linear. *Peduncles* extending well above the uppermost leaves, green or purplish, glabrous. *Involucre* 5.5–15 mm diam. *Bracts* 8–20, overlapping, mainly elliptic or obovate, sometimes ovate, 3.7–6.5 mm long, 1.4–3.7 mm wide, mainly herbaceous but with scarious apices and margins, entire, glabrous, apices often reddish or purplish. *Receptacle* conical, pitted [areolate], glabrous. *Ray florets* female, 13–27; corolla 7.8–16.7 mm long, 1.3–5.4 mm wide, with 4 (5) veins, white. *Disc florets* bisexual, 90–404, corolla 2–3.9 mm long, 0.7–1 mm diam., yellow. *Stamens* 5; anthers 1.09–1.66 mm long, microsporangia 0.8–1.28 mm long, apical appendages 0.22–0.38 mm long, base obtuse, endothelial tissue radial, filament collar composed of uniform cells and in outline slightly inflated but basally not thicker than filament. *Style* 1.8–2.4 mm long, branches 0.7–1 mm long. *Cypselas* somewhat heteromorphic, 2.1–2.3 mm long, curved; upper part of lateral margins winged, in ray florets wings extending c.  $\frac{1}{2}$ – $\frac{2}{3}$  the length of the fruit, wings of disc florets shorter, all wings with hairy margins, hairs inrolled at apex, some short glandular hairs present; lower part of fruit non-winged, more or less glabrous except for two basal tufts of hair, hairs long, inrolled at apex; surface of fruit minutely papillate, mature fruit dark brown or black; pericarp internally with lateral surface consisting of large-celled parenchyma but with an inner, continual, layer of sclerenchyma mostly 1 or occasionally 2 cells thick extending around the testa; testa of thin-walled cells (*R.J. Henderson 2029*); base of fruit peg-like,

lacking an annular carpopodium. *Pappus* of many, basally connate, scale-like hairs up to c. 0.7 mm long, whitish. *Chromosome number:*  $n = 3$ , 6. **Fig. 4E, F.**

*Distribution.* Confined to inland New South Wales and southern Queensland between latitudes c. 27° and 31°S and longitudes c. 144° and 151°E.

*Habitat.* *Brachyscome smithwhitei* grows in clay soils and compact sandy loam in low-lying areas subject to flooding, commonly being found in chenopod shrubland and open box woodland.

*Reproductive biology.* Pollen:ovule ratios ranging from 2,963 to 7,990 per capitulum were reported by Short & Watanabe (1993).

Salkin et al. (1995) recorded seed germinating well in 6–20 days.

*Cytology.* Chromosome numbers of  $n = 3$  & 6 and  $2n = 6$ , 12 + 0–2Bs were recorded by Smith-White et al. (1970, Fig. 25–27 & 40 as "*Brachyscome campylocarpa* sp. C"), Watanabe & Short (1992, Fig. 1F, as *B. sp. aff. campylocarpa*) and Watanabe et al. (1996b). An idiogram of somatic metaphase chromosomes was published by Watanabe et al. (1999, Fig. 73).

Data indicate that diploids are found in the north of the range, tetraploids in the south (Watanabe & Short 1992). The type specimen (*Short 3566*) is from a diploid population.

*Notes.* This species was included under *B. campylocarpa* by Davis (1948) and also has seemingly close affinities with *B. eriogona*. In all three species the fruit are curved but in *B. eriogona* the fruit margins are essentially entire and are ciliate throughout their length, unlike *B. smithwhitei* in which the fruit only has tufts of hair at the base and hairs on the margins on the flattened wing-like shoulder which is developed in the upper part of the fruit. In *B. campylocarpa* the mature black, curved fruits differ in that the margins are prominently lobed, each lobe having a few long hairs. *Brachyscome smithwhitei* is probably not sympatric with either *B. eriogona* or *B. campylocarpa*, both of which occur further inland.

*Brachyscome smithwhitei* also has affinities with chromosomally diverse *B. lineariloba*. There are specimens of *B. lineariloba* that have fruits with apical wing-like projections or shoulders and also a discontinuous row of long hairs on the fruit margin. However, the fruits are relatively straight, not curved, the wing-like apex poorly developed and the hairs are not reduced to a basal tuft. In *B. lineariloba* the leaves are more or less basal, not basal and cauline as they are in *B. smithwhitei*, a habit difference that usually makes for ready discrimination of the two species.

The somewhat heteromorphic nature of the fruits is presumably a function of differences in the timing of anthesis and pollination and lack of crowding as the fruits of the ray and outer disc florets develop.

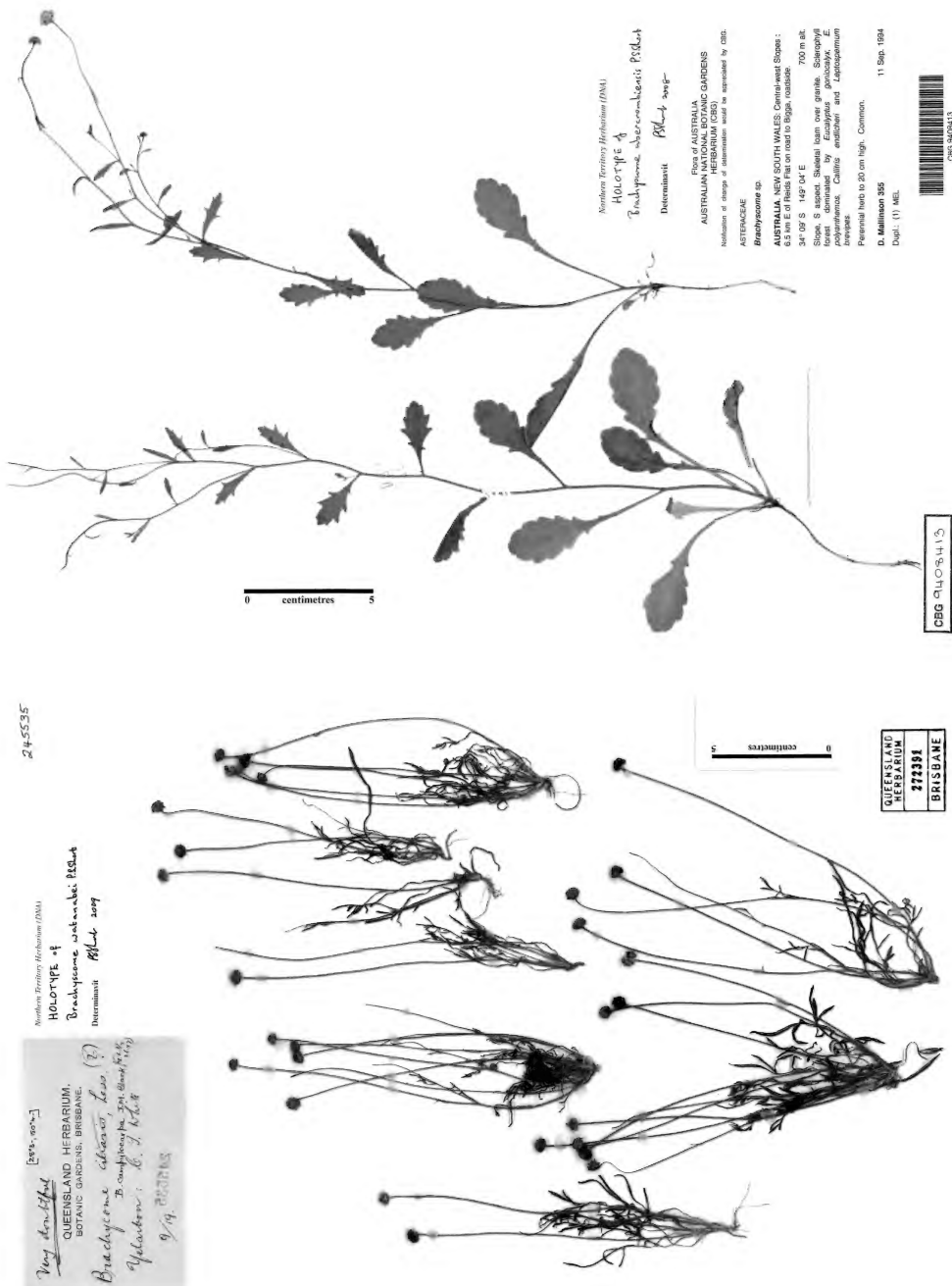


Fig. 38. Holotype of *Brachyscome abercrombiensis* (CBG), D.J. Malinson 355.

Fig. 37. Holotype of *Brachyscome watanabei* (BRI 272391), C.T. White.

*Selected specimens examined.*

QUEENSLAND: 32 km E of Eulo, 12 Sept. 1973, R.J. Henderson & D.E. Boyland, H2029 (BRI); 44 km W of Cunnamulla, 29 Aug. 1978, K.A. Williams 78226 (BRI).

NEW SOUTH WALES: Woorandara Stn, 30 Sept. 1973, E.M. Canning 3586 (CBG); Nangara Stn, 22 Oct. 1981, L. Haegi 2065 (AD, NSW); 24 miles W of Hay, 31 Aug. 1962, M.E. Phillips (AD, CBG 025301); 37 km N of Bourke along main road to Cunnamulla, 15 Aug. 1989, P.S. Short 3557 & K. Watanabe (MEL, NSW, TNS); 11¼ miles W of Hillston, 11 July 1969, S. Smith-White & C.R. Carter 4625 (SYD).

**50. *Brachyscome watanabei* P.S.Short, sp. nov.**

**Type:** Queensland. Yellarbon, Sept. 1919, C.T. White (**holotype:** BRI 272391).

*Brachyscome* aff. *campylocarpa*: E.Salkin et al., Austral. Brachyscomes 58 & 61 (Fig.) (1995).

[*Brachyscome campylocarpa* auct. non J.M.Black; G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 171 (1948) ("Brachyscome"), as to C.T. White collection from Yellarbon; Stanley in Stanley & E.M. Ross, Fl. SE Queensl. 2: 509, Fig. 71B (1986), p.p., as to Yellarbon.]

Annual herb, erect with stems c. 8–22 cm (and probably more) long, plants glabrous except for basal parts of leaves. Leaves basal and cauline, alternate, barely to obviously dilated and sheathing at base, mostly glabrous but with whitish, septate, straight to variously bent and curled cottony hairs to c. 1.5 mm long on the dilated base, sometimes extending along main leaf axis; scattered, stalked, glandular hairs sometimes present, all lobes apically terminating in a blunt mucro; first-formed and lower leaves linear, entire, to c. 70 mm long, to c. 0.7–2 mm wide, uppermost leaves may also be entire (and short) but many leaves pinnatisect; pinnatisect leaves c. 20–80 mm long, with 3–5 often irregular (not paired) lateral lobes; lateral lobes commonly linear, c. 7–12 mm long, 0.6–1 mm wide, lower ones about equalling to manifestly shorter than upper lobes, sometimes somewhat oblong and only c. 3 mm long. Peduncles much longer than leaves, glabrous. Involucre c. 6–9 mm diam. Bracts c. 11 or 12, overlapping, obovate to elliptic or widely ovate, c. 3.4–3.6 mm long, 1.4–3 mm wide, thinly herbaceous but with mainly entire, hyaline whitish apices and margins, glabrous. Receptacle at least subconical to conical when fruit mature, areolate, glabrous. Ray florets female, c. 10–16; corolla 3- or 4-veined, white. Disc florets bisexual, perhaps about 25–30 in an average-sized capitulum, corolla tube c. 1.8–2.5 mm long, the 5 lobes lacking apical hairs, yellow. Stamens 5; anthers c. 1–1.2 mm long, microsporangia c. 0.8–1 mm long, apical appendages c. 0.3 mm long, endothelial tissue radial, filament collar basally not thicker than filament. Style c. 2 mm long, arms c. 0.7 mm long, stigmatic part c. 0.4 mm long, sterile apical appendage deltate in outline, c. 0.25 mm long. Cypselas 1.7–2.4 mm long, 0.95–1.45 mm wide, at least curved apically, each of the lateral margins with c. 3–6 teeth or tuberculate outgrowths in at least the lower ½ and often for at least ¾ the length of the fruit but manifestly dilated and wing-like towards apex,

conspicuously so in outer fruit, fruit entirely or mostly dark brown-black except for whitish peg-like base; ab/adaxial ribs 0.3–0.3 mm wide; lateral margins with the wing-like upper part c. 0.4–0.6 mm wide, each tooth with 1 or more eglandular, pale whitish-yellow hairs, hairs c. 0.14–0.28 mm long, inconspicuously inrolled at apex, glandular hairs seemingly absent; base of fruit peg-like, lacking an annular carpopodium. Pappus of c. 20 or more erect, smooth bristles mostly of similar length, c. 0.2–0.8 mm long, shortly basally connate, pale yellowish. Chromosome number: unknown. Fig. 4G, H, 37.

**Distribution.** Recorded from inundated grass- and herb-dominated plains and on clay soils in remnant *Eucalyptus sideroxylon* woodland.

**Habitat.** Apparently a species of inundated grass- and herb-dominated plains and roadside verges with clay soil.

**Phenology.** Flowering specimens have only been encountered in late August, with fruiting material collected in September–October.

**Etymology.** Honours Professor Kuniaki Watanabe, for his immense contributions to our knowledge of the cytology of the Australian Asteraceae. Much of his work has been focused on the evolutionary relationships of members of the *B. lineariloba* group and it is appropriate that a member of this group is named after him.

**Notes.** Its pinnatisect leaves and curved fruit with lateral wings suggests that this species is most closely related to *B. campylocarpa*, *B. eriogona* and *B. smithwhitei*. *Brachyscome smithwhitei* is readily distinguished from *B. watanabei* in having the lateral wing only developed in the upper part of the fruit and by the basal tufts of hairs at the base of the cypselas. In *B. eriogona* the lateral wings are entire, or mostly so, throughout their length but are manifestly divided in *B. campylocarpa* and *B. watanabei*.

Although they are geographically separated by c. 1,000 km, *B. watanabei* can be difficult to distinguish from *B. campylocarpa*. However, the leaves of *B. watanabei* have fewer (3–5 vs 4–9) and mostly longer lateral lobes, the majority of fruit have lateral wings in which the upper, undivided part is usually shorter and more abruptly curved than in *B. campylocarpa*, and the teeth on the lateral wings tend to be more swollen and tubercule-like in this species than *B. campylocarpa*.

*Brachyscome watanabei* occurs on the eastern margins of the range occupied by *B. smithwhitei* and the two have been recorded as growing together.

*Additional specimens examined.*

QUEENSLAND: Yellarbon, Cunningham Highway, 28°34'S, 150°45'E, 309 Aug. 1993, E. Salkin 31 (ADSG120) (MEL 2028624); Yellarbon, 28°34'S, 150°45'E, 29 Aug. 1993, E. Salkin 33 (ADSG121) (MEL 2028625).

NEW SOUTH WALES: open plain 10 miles south-west of Gulargambone, 8 Oct. 1956, E.F. Biddiscombe (CANB

37885); c. 10.5 km due WSW of Narrabri, Wee Waa-Yarrie Lake Rd, 13 Nov. 2013, M. Sullivan & A. Palmer-Brodie (NSW, to be deposited).

### *Brachyscome muelleri* group

*Brachyscome muelleri* group: P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 849 (1999).

*Brachyscome ptychocarpa* group: P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 854 (1999).

Annual or short-lived perennial herbs, glabrous or nearly so. *Leaves* entire or pinnatisect. *Terminal anther appendages* present. *Cypselas* monomorphic, with 2 or 4 non-swollen, longitudinal ridges on each lateral surface, prominently winged, wings slightly to manifestly incurved. *Chromosome number*:  $n = 3, 6$ .

*Distribution*. South-eastern Australia.

*Notes*. Three species, *B. muelleri* Sond., *B. muelleroides* and *B. ptychocarpa*, are here grouped together as all have cypselas which have a combination of longitudinal ridges and curved wings, a feature generally allowing for quick identification. It is thus a practical grouping but not necessarily one reflecting a close relationship. Their affinities with each other and with other species in *Brachyscome* s.lat. needs further investigation, e.g. see note under *B. ptychocarpa*.

### 51. *Brachyscome muelleri* Sond.

Linnaea 25: 475 (1853) ("*Brachycome*"); Benth., Fl. Austral. 3: 514 (1867) ("*Brachycome*"); J.M.Black, Fl. S. Austral. 585, Fig. 2451 (1929) ("*Brachycome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 193, Fig. 53, 62, 63, pl. vi, map 20 (1948) ("*Brachycome*"); E.L.Robertson, J.M.Black's Fl. S. Austral., 855, Fig. 1152 P (1965, rev. edn) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1454, Fig. 656F (1986) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 148 (1995). — **Type citation**: "Gawler-town." **Holotype**: MEL 98624. **Isotype**: AD 97624138 (a single fruit); see below.

Ephemeral herb, branches weakly erect, from c. 5 to 23 cm long, glabrous except for some septate, eglandular hairs in the leaf axils. *Leaves* basal and cauline although mostly basal and near-basal and forming a rosette in small plants, possibly the first-formed and at least sometimes the uppermost leaves entire (and if so the uppermost linear) but most leaves 1-pinnatisect, 25–85 mm long, with a total of 4–12 (17) opposite to irregularly spaced, somewhat curving, ovate to triangular teeth or lobes along at least the upper half of their length; largest lobes 2–10 mm long, 1–4 mm wide, entire or with 1 or more small lateral teeth. *Peduncles* glabrous, at least at full-flowering manifestly longer than the uppermost leaf on the same axis. *Involucre* c. 4–7 mm diam. *Bracts* 11–18, of c. equal length, in 1 row, elliptic to narrowly elliptic, obovate to oblanceolate or ovate, 2.2–4.7 mm long, 0.8–1.8 mm wide, glandular hairs minute and confined to hyaline margins. *Receptacle* convex (according to Davis), areolate. *Ray florets* c. 14–37; corolla 4.8–7.1 mm long, 1.2–1.7 mm wide,

minutely 2-lobed, 3-veined, white or pale mauve. *Disc florets* 12–51, funnel-shaped, 5-lobed, corolla tube c. 1.4–2.2 mm long, yellow. *Stamens* 5; anthers 0.81–1.21 mm long, microsporangia 0.62–0.94 mm long, apical appendages 0.19–0.3 mm long; pollen grains c. 3,000–4,500 per floret. *Style* c. 1.55–2.1 mm long; arms c. 0.7–1.0 mm long, appendages somewhat triangular. *Cypselas* with two, non-swollen ridges on each lateral surface, with prominent, strongly incurved ab/adaxial wings, cypselas 1.4–2 mm long overall, in lateral view somewhat circular in outline, curved through its length, at full maturity all or mostly evenly black or brownish black; lateral surfaces of cypselas bodies non-tuberculate but with a distinct midline, with small, biseriate, curved eglandular hairs and glandular hairs common; wings with entire margins, both curling in the same direction, glabrous; pericarp internally with sclerenchymal tissue only present on the ab/adaxial margins, the longitudinal ridges and slightly extending into the ab/adaxial wings, collenchyma tissue found throughout the length of the wings; vascular bundles in pericarp 2; testa of evenly thickened cells (*P.S. Short* 3713); carpodium narrow, annular, whitish. *Pappus* absent, with only stalked glandular hairs at the apex of the fruit. *Chromosome number*:  $n = 3$ . **Fig. 4I**.

*Distribution*. Endemic to South Australia, this species first became known through the type specimen which was collected by Ferdinand Mueller in 1851 near the Para River in the vicinity of Gawler. The next known specimen was collected in 1885 from Corunna Station by Dr William Lennox Cleland and three years later it was gathered from Paskeville by Ernest Beythein. Since then, few additional herbarium specimens have been gathered and, with one exception, are from Baxter Hills near Corunna homestead. The exception, *Bates* 20721, was collected in 1989 from Mt St Mungo in the western Gawler Ranges.

Following unsuccessful field searches for populations of the species in 1995–97, Jusaitis et al. (2004) suggested that *B. muelleri* is now restricted to Baxter Hills, a population estimated in 1996 to contain 26,400 plants (Jusaitis et al. 2003).

Tate (1889) recorded *B. muelleri* from "Bushy places near Fountain", i.e. from southern Eyre Peninsula, but as noted under the account of *B. exilis*, I consider this to be a mistake in identification, as did Black (1929).

*Habitat*. The Baxter Hills population grows in loam on moist, shaded cliff slopes dominated by shrubs of *Cassinia*, *Dodonaea viscosa*, *Olearia decurrens* and *Ptilotus obovatus*. Native, annual species recorded as co-occurring with it include *Calotis hispida*, *Brachyscome perpusilla*, *Daucus glochidiatus*, *Geococcus pusillus* and *Geranium solanderi*, while weeds include *Anagallis arvensis*, *Fumaria capreolata* and *Sisymbrium erysimoides* (pers. obs.; Jusaitis et al. 2004).

*Phenology and reproductive biology*. Normally flowers in August/September.



Studies by Jusaitis et al. (2003) in 1995 showed that plants may complete their life cycle in approximately four months and that in field conditions a single plant will produce, on average, about 200 cypselas. They also found from experimental work that plants are self-compatible, self-pollination resulting in a high set of viable seed.

Pollen:ovule ratios ranging from 1,368 to 2,623 were determined from 15 capitula of *P.S. Short 3713*.

Jusaitis et al. (2003, 2004) reported that fresh seed are innately dormant and that low germination of four-month old seed can be overcome with gibberellic acid treatment but that 17-month old seed required no treatment. Seed longevity was found to be low, germinability of seed decreasing by more than 90% over a period of three years. They also noted optimal germination occurred at 20°C.

**Cytology.** Watanabe & Short (1992, Fig. 1c) recorded  $n = 3$  for the species. Mitotic karyotype idiograms were published in Adachi et al. (1997, Fig. 18) and Watanabe et al. (1999, Fig. 70), the latter also including a photomicrograph of the mitotic chromosomes (Watanabe et al. 1999, Fig. 4).

**Conservation.** In the long term, degradation of the habitat by invasive annual weeds may adversely affect the population at Baxter Hills but Jusaitis et al. (2004) reported that in terms of regeneration the population is currently relatively stable. They also reported the successful establishment of a new, translocated population.

**Typification.** Chapman (1991), in *Australian Plant Name Index*, erroneously referred to Davis (1948) as having selected a lectotype specimen. In fact, she recorded that “Attempts to trace syntype material of this species being unsuccessful, a haptotype was selected, which will become the neotype if it is later established that Sonder’s specimens are no longer extant” (Davis 1948, p. 193). As noted in the introductory text notes, a haptotype is not the same as a lectotype.

*Brachyscome muelleri* was described by Sonder from specimens forwarded to him, and also collected by, Ferdinand Mueller. With Sonder’s herbarium having been purchased by MEL in 1883 (Short 1990) it is logical, and normally the case, that type specimens of taxa described by Sonder are at MEL, as are often duplicates when based on specimens collected by Mueller. It is also usual for MEL specimens which once formed part of Sonder’s original herbarium to be clearly annotated as having been so. Clearly, as now, when seen by Davis there was no indication on undoubted authentic type material of *B. muelleri* that it had been examined by Sonder.

Davis (1948), when designating her haptotype and listing other specimens examined, made reference to two collections in a fashion that suggests that at the time she saw them they were unmounted, separate specimens, these being her haptotype specimen collected by

Mueller in Sept. 1851 from grassy plains of the Para River and another Mueller specimen she cited as coming from “near Gawler Town”, a locality which, unlike the former, is totally in accord with the protologue.

Today, the only authentic material at MEL pertaining to the name *B. muelleri* is all mounted on the one sheet, MEL 98264. There are two major elements on the sheet. The larger element is of a flowering plant with roots attached and is mounted in the upper half of the sheet, while the other is of a single branchlet mounted below; the basal cut on the branchlet appears to match a cut on the larger element, suggesting that both elements are of the one plant. Neither of these elements are directly associated with a label, there being two labels attached next to each other at the bottom of the sheet. One is the original, handwritten collector’s label and is annotated “In planitie graminosa Para rivum/ Sept. 1851”, and the other is a blue “Botanical Museum of Melbourne” label on which is written the locality “near Gawler town”. Both labels have the initial “B” on the corner indicating examination by Bentham but he (Bentham 1867) only cited “Near Gawler Town, *F. Mueller*” in his treatment of the species in *Flora Australiensis*. This strongly suggests the annotation “near Gawler town” is nothing but a generalisation of the locality given on the original label, a practice which is commonly encountered with Mueller’s collections and also not an illogical conclusion given the likelihood that both major elements constitute a single plant. However, the presence on the sheet of three separate packets, one of which contains fruit and is annotated by J.H. Willis as coming from “Near Gawler ... Sept. 1851”, another annotated in an unknown hand “Para R., Sept. 51”, and a third annotated by Mueller & J.H. Willis but without locality, again indicates that the two major elements were once treated as individual specimens, as indeed does the fact that both individual labels, not one, have the initialled ‘B’ on the reverse.

In J.M. Black’s herbarium, now in AD, there is a specimen which consists of a single fruit attached to Black’s sketches of the species. Black recorded on the specimen “achene drawn from type, Para River near Gawler (Vict. Hb.)”. This wording also supports the belief that all MEL material has been generally accepted as being from a single gathering and that “Gawler-town” is a generalisation of the locality; indeed, this must be the reason why all such material is now mounted on the same sheet.

That MEL 98264 consists of two elements from the one gathering and with different labels is, I believe, indisputable. As such I have considered the possibility that one of the elements on MEL 98264 is in fact from Sonder’s herbarium, a lack of appropriate labelling reflecting this being nothing more than a loss of a label or mistake in curation between the time of the arrival of Sonder’s herbarium in Melbourne and the mounting of the component elements of the sheet. If accepting this as a possibility then the larger element with attached roots has to be excluded from consideration as, in his

description, Sonder indicated that basal parts of the plant were missing. This leaves the single branchlet as the possible major element examined by Sonder but it lacks an obviously scrobiculate receptacle referred to in the original description and the cypselas are not particularly well-developed. However, there is considerable fragmentary material, including mature fruit, in the packet annotated by Mueller and together with the branchlet I can well believe that this is the material used by Sonder to compile his description. To this – given that Gawler-town was cited in the protologue – also should be added the cypselas in the packet annotated “near Gawler” by J.H. Willis.

I have had cause to examine type material of a number of Australian species of Asteraceae described by Sonder and it would be highly unusual for material seen by him not to be in MEL. This fact also adds support to my speculation that some of the elements contained on the sheet MEL 98264 were indeed seen by Sonder when naming *B. muelleri*.

I have thus concluded that the two major elements and associated fragment packets now mounted on MEL 98264 are of the one taxon, that all elements should be considered to be from the one gathering, and that various elements on that sheet were probably seen by Sonder. As this conclusion is at least partly speculative I simply refer, above, to MEL 98264 as being a “type” specimen, one likely comprised of a mix of the holotype and duplicate isotype material of the name *B. muelleri*.

#### *Additional specimens examined.*

SOUTH AUSTRALIA: Mt St Mungo, Sept. 1989, *R. Bates* 20721 (AD); Paskerville, 26 Sept. 1888, *E. Beythien* 152 (MEL); Corunna Hill South, 22 Aug. 1983, *J.D. Briggs* 970 (AD, NSW, MEL); Corunna Hill South, valley behind homestead, 7 Sept. 1974, *R.J. Chinnock & B. Copley* 1801 (AD); Corunna Hill South, 8 Aug. 1974, *R.J. Chinnock & B. Copley* 2017 (AD); Coroon [sic] Station, June 1885, *W.L. Cleland* (AD 97220163 – ex herb. J.B. Cleland, AD 97624139 – ex herb. J.M.Black, MEL 23938 – single leaf, per J.M.Black); Corunna Hill South, 29 Aug. 1989, *P.S. Short* 3713 (MEL).

#### **52. *Brachyscome muelleroides* G.L.R.Davis**

Proc. Linn. Soc. New South Wales 73: 194, Fig. 54, 64, 65, pl. vi, map 20 (1948) (“*Brachycome*”); J.H.Willis, Handb. Pl. Victoria 2: 669 (1973) (“*Brachycome*”); J.Everett in G.J.Harden, Fl. New South Wales 3: 164 (1992) (“*Brachycome*”); E.Salkin et al., Austral. Brachyscomes 150 (1995); P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 850, Fig. 172a (1999). — **Type citation:** “Wagga, 10.1889, J.J. Fletcher (NSW).” **Holotype:** NSW 15385 p.p., excl. isotypes. **Isotypes:** MEL 220347, NSW 15385 p.p., excl. holotype.

*Herb.*, branches weakly erect, to 20 cm high, glabrous. *Leaves* basal and cauline, usually linear, 10–70 mm long, 0.5–1.5 mm wide, entire or sometimes with several short, linear, irregularly placed lobes. *Peduncles* glabrous, usually longer than uppermost leaf on the same axis. *Involucre* 4–6 mm diam. *Bracts* 8–10, of c. equal length, in 1 row, obovate or elliptic, 2.3–2.8 mm long,

1.1–1.8 mm wide, glandular hairs confined to margins. *Receptacle* convex, areolate. *Ray florets* c. 50–60 in an average-sized head; corolla 1.9–4.6 mm long, 0.5–0.9 mm wide, white. *Disc florets* c. 45, broadly funnel-shaped, 5-lobed, corolla tube c. 1 mm long. *Stamens* 5; anthers 0.55–0.72 mm long, microsporangia 0.41–0.59 mm long, apical appendages triangular, 0.13–0.2 mm long. *Style* c. 1.3–1.5 mm long; arms c. 0.45–0.7 mm long, appendages somewhat triangular, about equalling stigmatic part. *Cypselas* with two, non-swollen ridges on each lateral surface, with prominent, strongly incurved ab/adaxial wings, cypselas 0.8–0.9 mm long, curved through its length, more or less uniformly brown; lateral surface of cypselas body with scattered, apically-curved hairs, with some scattered, short, glandular hairs; wings with entire margins, glabrous; pericarp internally with an inner layer of continual sclerenchyma surrounding the testa; vascular bundles 2, with 1 in each of the ab/adaxial margins; testa cells thin-walled (*T.B. Muir* 4701); carpodium annular, whitish. *Pappus* of c. 10 spreading, white, bristles 0.1–0.2 mm long. *Chromosome number:*  $n = 3$ . **Fig. 4J, 11B.**

*Distribution.* Restricted to floodplains of the Murray River and the Murrumbidgee River and their tributaries in south-eastern New South Wales and north-eastern Victoria. In Victoria it is found from Tocumwal east to the Ovens River.

*Habitat.* Appears to be restricted to temporarily inundated situations where it is recorded as growing in loam and clay soils. It has been recorded by various collectors as growing with species of *Calotis*, *Centipeda* and *Cotula*, *Danthonia duttoniana*, *Eragrostis australasica* and *Pycnosorus globosus*. The ecologist C.W.E. Moore noted that a collection he made in grassland near Jerilderie in 1950 was “probably originally” an *Acacia pendula* – *Atriplex nummularia* association.

*Reproductive biology.* A pollen:ovule ratio of 1,500 was determined for a capitulum of *T.B. Muir* 4701; it contained 61 ray forets and 44 bisexual disc florets.

Salkin et al. (1995) indicated that seed germinates poorly in about four months.

*Cytology.* The chromosome number of  $n = 3$  was reported by Watanabe et al. (1996b, Fig. 1A) from a population on Ulupna Island; a somatic metaphase karyotype idiogram was illustrated in Watanabe et al. (1999, Fig. 72).

*Notes.* As indicated by the specific epithet *B. muelleroides* seems to be closely related to the rare South Australian endemic, *B. muelleri*.

#### *Additional specimens examined.*

NEW SOUTH WALES: Morundah, pastoral property owned by Defence Department south of Narrandera, 13 Oct. 1995, *P. Foreman* 265 (MEL); ?Buckinbah, 1879, *D. Jones* ?9 (MEL 220345); Bulgandry Reserve, 8 Sept. 1949, *E.J. McBarron* 3555(bis) (SYD); Fagan’s Reserve, 3 miles N of Walbundrie, 14 Oct. 1949, *E.J. McBarron* 3801 (MEL, NSW, SYD); Bul-

gandry, 14 Oct. 1949, *E.J. McBarron 3799(bis)* (NSW, SYD); Fagan's Reserve, 3 miles N of Walbundrie, 16 Oct. 1950, *E.J. McBarron 5126* (SYD); Wallandool Reserve, near Urangeline, 18 Sept. 1951, *E.J. McBarron 5543(bis)* (NSW); Narrandera-Jerilderie, 29 Aug. 1950, *C.W.E. Moore 1321* (CANB).

VICTORIA: Lower Ovens Regional Park, 26 Sept. 1985, *A.C. Beauglehole 81016* (CANB, MEL); Tocumwal Regional Park, 27 Sept. 1985, *A.C. Beauglehole 81223* (MEL); Barmah State Park, 29 Sept. 1985, *A.C. Beauglehole 81288* (MEL); Barmah Forest, Forcing Yards, 10 Oct. 1979, *E.A. Chesterfield* (MEL 613629); Ulupna Island Reserve, 3 miles NW of Strathmerton, 7 Oct. 1969, *T.B. Muir 4701* (MEL – 2 sheets, PERTH); adjacent to Barmah Forest, Nov. 1983, *W.E. Mulham 1521* (NSW); Ulupna Island State Park, 23 Sept. 1992, *K. Watanabe 3* (MEL); Ulupna Island State Park, 26 Sept. 1993, *K. Watanabe 93* (MEL); about 1 mile E of Picola, Oct. 1930, *J.H. Willis* (BRI 126673, MEL 655154, MEL 220346, NSW 15384).

### 53. *Brachyscome ptychocarpa* F.Muell.

Defin. Austral. Pl. 10 (28 June–12 July 1855) (*"Brachyscome"*), preprint from Trans. Philos. Soc. Victoria 1: 43 (10 Sept. 1855), reprinted in Hooker's J. Bot. & Kew Gard. Misc. 8: 148 (1856); Benth., Fl. Austral. 3: 516 (1867), p.p. (only as to Mueller's type specimen); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 160, Fig. 14, 25, pl. vi, map 6 (1948) (*"Brachyscome"*); J.H. Willis, Handb. Pl. Victoria 2: 667 (1973) (*"Brachyscome"*); J. Everett in G.J. Harden, Fl. New South Wales 3: 163 (1992) (*"Brachyscome"*); E. Salkin et al., Austral. Brachyscomes 186 (1995); P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 855, Fig. 173c non 173b (1999). — **Type citation**: "In the Buffalo Mountains." **Lectotype**: Buffalo Range, 26.ii.1853, *F. Mueller* (MEL 220574 p.p.). (Davis 1948, p. 160). **Isolectotype**: MEL 220574 p.p.

[*Steiroglossa lineariloba* auct. non DC.: Benth., Fl. Austral. 3: 516 (1867) (*"Brachyscome"*), p.p. (as to Cunningham's type specimen).]

Annual or short-lived perennial *herb* with an often extensive root system; major axes erect, 5–20 cm high, glabrous. *Leaves* mainly basal but also cauline, some leaves linear but at least the larger plants with mostly pinnatisect leaves 1–6 cm long, with 4–11, narrowly elliptic or linear, bluntly mucronate lobes, glabrous. *Peduncles* glabrous, much longer than uppermost leaf on the same axis. *Receptacle* conical. *Involucre* 5–8 mm diam. *Bracts* 12–15, obovate or elliptic, 1.2–3 mm long, 0.7–1.9 mm wide, apically obtuse, basal and central part green, margins and apex scarious, purplish, glandular hairs confined to margins. *Ray florets* 25–40; corolla 4–6.5 mm long, 1.1–1.4 mm wide, variously recorded as "white", "light pink", "pinkish", "bluish", "mauve to white" and "white ... pink on drying", with (3) 4 or 5 veins, sometimes a 6<sup>th</sup> vein developing about ½ way along the corolla. *Disc florets* c. 70–115, 5-lobed, corolla tube 1.4–1.7 mm long, yellow. *Stamens* 5; anthers 0.74–0.9 mm long, microsporangia 0.6–0.7 mm long, apical appendages 0.14–0.22 mm long, filament collar about straight in outline, basally not thicker than the filament. *Style* c. 1.1–1.3 mm long; arms c. 0.45–0.58 mm long, appendage somewhat triangular, 0.25–0.35 mm long equalling or slightly longer than stigmatic part which is



Fig. 39. *Brachyscome ptychocarpa*, Mt Mittamatite Regional Park, Vic. — P.S. Short 4151.

c. 0.2–0.27 mm long. *Cypselas* with two, non-swollen, undulate ridges on each of the lateral surfaces, with prominent, flat or slightly incurved ab/adaxial wings, if curving then not always in the same direction, fruit c. 1 mm long, straight, body dark brown, ab/adaxial wings pale yellow-brown; lateral surfaces of fruit body each with a central ridge running the length of the fruit, ridge with apically-curved hairs; ab/adaxial wings with entire margins, margins with apically-curved hairs; pericarp internally with a discontinuous sclerenchymatous layer; vascular bundles 2, with 1 in each of the ab/adaxial margins; testa cells with u-shaped thickening (cultivated, unvouchered specimen); carpodium annular, whitish. *Pappus* of 10–15 spreading, white, connate bristles 0.1–0.2 mm long. *Chromosome number*:  $n = 6$ . **Fig. 4K, 39.**

**Distribution.** Restricted to south-eastern New South Wales (south of about Rylstone) and north-eastern Victoria.

**Habitat.** A plant of moist habitats. Collectors' notes include: "gently undulating hills, grey clay loam, open woodland with grass-herb understorey ..." and "in clay loam at edge of road and beneath shrubs of *Kunzea parviflora*, but mainly in loamy soil and among moss over granite rock". Recent Victorian collections are only known from rock outcroppings, reflecting perhaps a loss of habitat through clearing and weed incursion. In 1961 the collector W.E. Giles (NSW 53079) noted that "it is liable to suppression by rank introduced grasses, e.g. Yorkshire Fog."

**Phenology and reproductive biology.** Flowering specimens have been collected in most months, although, at

least in Victoria, flowering is seemingly most common from early November to the end of February.

Herbarium specimens suggest that, in the wild, it may usually behave as an annual. However, the collector Giles (NSW 53079) recorded that “the potted *Brachycome ptychocarpa* is still carrying odd blossoms in this its second season. It seems to be almost ever-blooming – or would be but for our cold winter.” Salkin et al. (1995) confirmed the long-flowering, perennial nature of cultivated specimens.

Pollen:ovule ratios ranging from 1,605 to 2,354 were determined from five individuals of *P.S. Short 4151*.

Salkin et al. (1995) recorded good germination of seed in 3–50 days.

**Cytology.** The chromosome number ( $n = 6$ ,  $2n = 12$ ) of this species was reported by Smith-White et al. (1970, Fig. 6 & 17) from Wallerawang, Wattle Flat and Ben Bullen in New South Wales and by Watanabe et al. (1996b) from Mt Mittamatite Regional Park in Victoria. A somatic metaphase karyotype idiogram has been published in both Watanabe et al. (1996a, Fig. 29) and in Watanabe et al. (1999, Fig. 56).

**Notes.** Everett (1992) made reference to stoloniferous specimens in the Central Tableland of New South Wales but from the material I’ve seen I think this unlikely.

I (Short 1999) have previously noted the cypselas morphology suggested affinity with the *B. nivalis* group but several major features, including chromosome number and the lack of thickening of the epidermal cells of the bracts, distinguish it from that group. As indicated by Salkin et al. (1995) it is perhaps closest to *B. dissectifolia* and *B. stuartii*; habit and leaf morphology and a common haploid chromosome number of  $n = 6$  certainly supporting this suggestion, as do the winged cypselas of *B. dissectifolia*.

#### *Selected specimens examined.*

NEW SOUTH WALES: Mount Canobolas, 8 Nov. 1960, *E.F. Constable* (K, NSW 53342); Paddy’s River Falls, 3 Jan. 1963, *E.J. McBaron* 7403 (NSW).

VICTORIA: Plateau 1 km S of Pine Mtn, 5 Nov. 1983, *S.J. Forbes* 1846 (MEL); 8.4 km by road S of Tatong, 5 Nov. 1983, *N.H. Scarlett* 83-341 (MEL); Mt Mittamatite Regional Park, 3 Dec. 1993, *P.S. Short 4151* (MEL).

### ***Brachyscome multifida* group**

*Brachyscome multifida* group: P.S.Short in N.G.Walsh & Entwistle, Fl. Victoria 4: 850 (1999).

Perennial *shrubs* or annual or perennial herbs, subglabrous to prominently hairy, with long, septate, uniseriate, eglandular hairs present or absent, stalked glandular hairs present. *Leaves* usually basal and cauline, sometimes only in basal tufts (*B. stuartii* complex), usually alternate but uppermost cauline leaves sometimes opposite (*B. microcarpa* complex), entire or variously divided, in some taxa 1- or 2-pinnatifid, glabrous, or with hairs as on stems. *Bracts* in 1 or 2 rows, overlapping, of similar lengths, mainly

herbaceous but margins hyaline, margins entire or laciniate or slightly serrate. *Receptacle* somewhat concave, hemispherical, subconical or conical, areolate or alveolate, epaleate, glabrous. *Ray florets* female, corolla white or shades of blue to purple. *Disc florets* bisexual, 5-lobed, yellow. *Stamens* 5; anthers with terminal anther appendages usually prominent, rarely not or barely developed (*B. stuartii* complex). *Style arms* with appendages variously deltate to narrowly triangular in outline, shorter to c. 3 times longer than stigmatic part. *Cypselas* monomorphic, yellowish brown, brown, brownish black or black, obovate in outline, straight or very slightly curving along the long axis, lateral surfaces with longitudinal ridges absent or present (*B. microcarpa* & *B. stuartii* complexes only), commonly tuberculate; ab/adaxial margins unwinged and entire or tuberculate, or winged (*B. stuartii* complex only); eglandular hairs present, sometimes few, hairs straight and curved, with blunt or bifid apices or hairs apically-curved; pericarp with two vascular bundles, lacking secretory canals; cells of the testa with evenly thickened walls; carpodium present, annular. *Pappus* a crown of short bristles, individual elements to 1.1 mm but often much shorter (e.g. barely 0.6 mm long in *B. novae-anglica*, absent or little more than 0.02–0.05 mm long in *B. tamworthensis*). *Chromosome numbers*:  $n = 5, 6, 7, 9, 12, 14$ .

**Distribution.** Eastern and south-eastern mainland Australia and perhaps Tasmania.

**Notes.** A poorly circumscribed and artificial grouping primarily distinguished from the *B. triloba* group by the cypselas of most species lacking wing-like extensions on their ab/adaxial margins and usually by lacking longitudinal ridges on the lateral surfaces.

Three new species, *B. abercrombiensis*, *B. tamworthensis* and *B. trisecta* are described here.

### **54. *Brachyscome abercrombiensis* P.S.Short, sp. nov.**

**Type:** New South Wales. 6.5 km E of Reids Flat on road to Bigga, 34°09’S, 149°04’E, 11 Sept. 1994, *D.J. Mallinson* 355 (**holotype**: CBG 9408413; **isotype**: MEL 724555).

Perennial *herb* with weakly ascending branches to at least 35 cm long, stalked, bi- or basally multiseriate glandular hairs with whitish stalks found throughout, mostly scattered to moderately dense, sometimes forming a dense indumentum which almost obscures the surface of the scape immediately beneath the capitulum, hairs of unequal length, 0.09–0.36 mm long; eglandular hairs apparently absent. *Leaves* basal and cauline, alternate, thin, basal and some mid-cauline leaves tapering to distinct, petiole-like bases which may be up to c. 30 mm long, upper and some mid-cauline leaves lacking petiole-like bases; basal and lower-cauline and sometimes mid-cauline leaves mostly spatulate or linear-oblongate in outline, 18–80 mm long, 5–20 mm wide, with 2–11 teeth or lobes, lobes prominent but mostly shallow, somewhat rounded, only lowermost

extending c.  $\frac{1}{2}$  way to midrib, resultant lobes acute; mid-cauline leaves with 3–7 lobes, lobes tending to be more deeply cut than in lower leaves, commonly acute; upper leaves only or mostly entire, linear or linear-oblongate, 5–21 mm long, 0.4–3 (6) mm wide, acute, sometimes with 1 or 2 small lateral teeth or lobes; at least mature leaves with generally scattered hairs, never dense, leaf mostly glabrous. *Peduncles* exceeding upper leaves. *Involute* c. 4.5–6.5 mm diam. *Bracts* c. 16–18, in 2 rows of similar length, obovate to oblanceolate, 1.9–2.9 mm long, 0.5–1.0 mm wide, thinly herbaceous but with hyaline margins and apex, apices sometimes subobtusely, mostly manifestly acute to acuminate, outer surface with or without scattered, stalked glandular hairs. *Receptacle* subconical, glabrous. *Ray florets* c. 20–32; corolla 6.7–7.6 mm long, 0.85–1.4 mm wide, veins 4 (5), apically entire or minutely 2- or 3-toothed, white or blue. *Disc florets* c. 60–70; corolla 1.4–1.7 mm long, 5-lobed, yellow, lobes lacking apical hairs. *Stamens* 5; filament collar straight in outline or barely dilating towards base, not or barely wider than the filament; anthers 0.9–0.95 mm long, microsporangia 0.72–0.74 mm long, apical appendages 0.17–0.19 mm long, somewhat oblong in outline, base obtuse; endothelial tissue radial; pollen grains c. 2,300 per floret. *Styles* with arms 0.48–0.51 mm long, stigmatic part 0.25–0.33 mm long, appendages somewhat triangular in outline, 0.18–0.23 mm long, shorter than stigmatic part. *Cypselas* flat, obovate, straight or slightly curved, 1.4–1.55 mm long, 0.62–0.7 mm broad; lateral surfaces lacking longitudinal ridges, immature fruit greenish or greenish brown, mature fruit brown or blackish, with c. 5–15 somewhat indistinct tubercles, each tubercle terminating in an eglandular hair; eglandular hairs 0.04–0.08 mm long, straight or slightly curving along their length, biseriate, terminal cells equal in length or unequal, but if unequal remaining parallel with each other and not appearing bifid; ab/adaxial margins unwinged, smooth, lacking tubercles and hairs; pericarp with 2 vascular bundles; carpodium narrow, 0.03–0.09 mm wide, commonly whitish, distinct from the body. *Pappus* a crown of whitish bristles joined for c.  $\frac{1}{4}$ – $\frac{1}{2}$  their length; bristles uneven in length, from 0.2–0.4 mm long, erect to slightly spreading. *Chromosome number*: unknown. **Fig. 5B, 38.**

**Distribution.** Only known from a small region between Abercrombie Caves (33°54'S, 149°21'E) and Reids Flat (34°08'S, 149°01'E), New South Wales and, as such, found in the south-western corner of the Central Tablelands and the eastern margins of the Central Western Slopes, the N.S.W. floristic regions recognised by Anderson (1961).

**Habitat.** The only detailed notes concerning the habitat are from the type specimen, where it was recorded in skeletal loam over granite in a sclerophyll forest dominated by *Eucalyptus goniocalyx*, *E. polyanthemos*, *Callitris endlicheri* and *Leptospermum brevipes*.

**Phenology and reproductive biology.** Flowering and fruiting has been recorded in September, October and March.

The capitula are relatively small, but a pollen:ovule ratio of 1,663 recorded from a capitulum of *E.F. Constable* (NSW 55990) suggests that cross-pollination is the norm. No pollen sterility was observed.

**Etymology.** After Abercrombie Caves, the region from which it was first collected.

**Notes.** A specimen collected by Constable (NSW 31214) from Grove Creek Falls is here considered to be of this species. It is atypical in that basal leaves are mostly lacking (and in poor condition) and most leaves are somewhat linear and entire, not just the upper ones. However, the remnant basal leaves have long petiole-like bases and the glandular hairs and their distribution, the size and shape of the fruit, and the pappus morphology suggest it is the same taxon. The lack of basal leaves may reflect the age of the plant, and the preponderance of small, entire leaves perhaps the degree of shading in which the plant or plants (there are multiple stems bunched together on the one sheet) were growing, it being recorded that this “trailing herb” was found among rocks at the top of the falls.

The habit and leaf shape of this species suggests a close relationship with members of the *B. triloba* group, such as *B. sieberi* and *B. kaputarensis*, but it differs from them in that the lateral surfaces of the cypselas lack longitudinal ridges, a characteristic of many of the species included here in the *B. multifida* group. *Brachyscome abercrombiensis* differs from *B. novae-anglica* and *B. tamworthensis* in its less robust habit and larger pappus, and from *B. microcarpa* in the uppermost leaves being alternate, not opposite.

**Additional specimens examined:**

NEW SOUTH WALES: Grove Creek Falls, 23 March 1955, *E.F. Constable* (NSW 31214); Abercrombie Caves, 22 Oct. 1958, *E.F. Constable* (MEL 2035491, NSW 55990 *n.v.*).

### 55. *Brachyscome dissectifolia* G.L.R.Davis

Proc. Linn. Soc. New South Wales 73: 163, Fig. 17, 27, pl. vi, map 8 (1948) (“*Brachycome*”); J.Everett in G.J.Harden, Fl. New South Wales 3: 167 (1992) (“*Brachycome*”); E.Salkin et al., Austral. Brachyscomes 96 (1995). —

**Type citation:** “*Holotype*: Ten miles south-east of Guyra, ‘swampy ground’, 18.2.1941, G. L. Davis (NSW). *Paratypes*: Three, l.c. (MEL, BRI, AD).” **Holotype:** NSW 15190. **Isotypes:** AD 98419311, BRI 010111, MEL 220807.

No description is given here, but see notes below. For an illustration of a cypselas see **Fig. 5C.**

**Distribution.** Northern Tablelands and North-Western slopes of New South Wales.

**Reproductive biology.** A stoloniferous perennial for which a single pollen:ovule ratio of 1,655 was determined from *P.S. Short* 3973, a collection gathered

near Backwater, N.S.W.; the capitulum contained 50 ray and 74 disc florets.

Salkin et al. (1995) recorded that germination takes 6–20 days.

**Cytology.** Smith-White et al. (1970) recorded  $n = 6$  and  $2n = 12$  for specimens from Guyra and Glencoe, and Watanabe et al. (1996b) recorded  $n = 12$ ,  $2n = 24$  from a single population (*Short* 3973) near Backwater. Watanabe et al. (1999, Fig. 55) published an idiogram of somatic metaphase chromosomes ( $2n = 12$ ) from *Salkin*, a collection from Dawson Swamp, Mt Kaputar National Park, N.S.W.

**Notes.** Application of the names *B. dissectifolia* and *B. stuartii* can be difficult. I have little doubt that the species should be maintained, but how they are delimited and whether additional distinctive entities are worthy of formal recognition is something which requires more work. The combination of characters used in the key should generally enable the discrimination of *B. dissectifolia* s.str. from other specimens placed in the complex. When applying determinavit slips to specimens I indicated which specimens I believe are of the former taxon, while others are simply referred to *B. stuartii* despite considerable variation in leaf shape, etc. For descriptions, illustrations and an outline of some of the variation in leaf and fruit morphology see Salkin et al. (1995).

Sectioned fruit from specimens I have referred to *B. dissectifolia* (Davis, PERTH 412791) and *B. stuartii* (I.R. Telford 8989) show that in both taxa there are two vascular bundles in the pericarp, that sclerenchymatous thickening is confined to the vicinity of the vascular bundles (i.e. the ab/adaxial ribs), and that the cells of the testa are evenly thickened.

The terminal anther appendage is absent or at least barely developed in *B. dissectifolia* (to c. 0.1 mm in *P.S. Short* 3973 and *Salkin* AD SG 126) and c. 0.3 mm long in a specimen (*K. Watanabe* 18) of *B. stuartii*. Conversely, the terminal style appendage is, at least in some specimens, longer and narrower in *B. dissectifolia* (c. 0.5 mm long in *P.S. Short* 3973) than in *B. stuartii* (c. 0.25 mm long and apically somewhat blunt). To what extent these attributes vary within the complex needs further investigation but when in doubt I have used them, as in the above key, to place specimens in, or exclude them from, *B. dissectifolia* s.str.

#### *Specimens examined.*

NEW SOUTH WALES: 5 miles from Guyra on Baldersleigh road, 23 Mar. 1941, *C. Davis* (AD 98419310, MEL 220804; NSW 15191); Port Stephens, 4 Sept. 1941, *C. Davis* (BRI 331172, MEL 220802; NSW 15187); Booroolong Creek, Inverell road near Armidale, 18 Feb. 1941, *G.L. Davis* (MEL 220801; NSW 15188); Inverell road, 7 miles W of Guyra, 18 Feb. 1941, *G.L. Davis* (BRI 331171, NSW 15192); Rose Hill, Guyra, 24 Feb. 1941, *G.L. Davis* (BRI 331173, HO 117516, MEL 220803; NSW 15189, PERTH 412791); margin of swamp on laterite, Armidale, 9 Oct. 1955, *G.L. Davis* (AD 98669187); Eckards Lookout, Mt Kaputar N.P., 25 Nov. 1987,

*J.M. Fox* 87/122 (CANB); head of the Gwydir, *L. Leichhardt* (MEL 220800); Llangothlin, 8 Jan. 1956, *M. Gray* (CANB 93309); Subway, S of Guyra, 25 Apr. 1930, *E.N. McKie* (NSW 15193); near [?Bellsfalls], Black Mtn road, 4 May 1930, *E.N. McKie* (NSW 15194); Mt Lindesay, 14 Apr. 1914, *H.M.R. Rupp* (NSW 15186); Dawson Springs, Mt Kaputar N.P., 25 Sept. 1992, *E. Salkin* AD SG 126 (MEL); 3.5 km NW of Backwater along road to Glencoe, 30 Jan. 1993, *P.S. Short* 3973 (MEL, NSW, TI); 9 miles SE of Guyra, 10 Jan. 1969, *S. Smith-White* 3409 (SYD); 5 miles from Guyra, Backwater road, 11 Jan. 1969, *S. Smith-White* 3410 (SYD); 13 miles from Guyra on Mt Mitchell road, 11 Jan. 1961, *S. Smith-White* 3429 (SYD); 5 miles from Backwater on Mt Mitchell road, 11 Jan. 1969, *S. Smith-White* 3430 (SYD); 12 miles E of Glencoe on Mt Mitchell road, near Sara River, 11 Jan. 1969, *S. Smith-White* 3461, 3462 (SYD).

#### 56. *Brachyscome melanocarpa* Sond. & F.Muell. ex Sond.

Linnaea 25: 476 (1853) ("*Brachycome*"); J.M.Black, Fl. S. Austral. 582, Fig. 246B (1929) ("*Brachycome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 179, Fig. 40, 47, 48, pl. vi, map 15 (1948) ("*Brachycome*"); E.L.Robertson, J.M. Black's Fl. S. Austral., 852, Fig. 1152B (1965, rev. edn) ("*Brachycome*"); G.M.Cunningham et al., Pl. W. New South Wales 649, Fig. 64i (1981) ("*Brachycome*"); Jessop, Fl. Centr. Austral. 369 (1981) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, Fl. S. Austral. 3: 1454, Fig. 656E (1986) ("*Brachycome*"); Stanley in Stanley & E.M.Ross, Fl. SE Queensl. 2: 510, Fig. 71K (1986); J.Everett in G.J.Harden, Fl. N.S.W. 3: 159 (1992) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 142 (1995). — **Type citation:** "Ad fluvium Murray." **Lectotype:** Murray River, *F. Mueller* (MEL 115990 p.p.). (Davis 1948, p. 179). **Isolectotypes:** MEL 115990 p.p., MEL 115991 (from "above Moorundie", Feb. 1851). See notes below.

Annual or perennial *herb*; branches weakly erect, largest to c. 50 cm long, with long-septate, uniseriate, eglandular hairs c. 0.25–0.6 mm long and stalked glandular hairs of various lengths; glandular hairs dense below capitula, only of shorter hairs of similar size and to c. 0.05 mm long, or manifestly variable in length, the longer hairs to c. 0.2 mm long. *Leaves* basal and cauline, sessile, commonly linear-oblongate or linear-spathulate in outline, 10–90 mm long, 2.5–20 mm wide (lower leaves the widest and falling as plants mature leaving widest leaves often much less than 10 mm wide), some leaves entire but mostly with the upper c. 1/4–1/2 of the leaf 1-pinnatifid, with usually 1–5 lobes on each margin, often with 1–4 much smaller lobes (teeth) in the lower half, these mostly basal, in upper leaves all lobes often small and apex shallowly trifid; major lateral lobes apically acute to obtuse, commonly entire, sometimes with minor secondary lobes or teeth; all leaves with a scattered to dense indumentum of stalked glandular hairs and almost straight to crooked, eglandular, septate hairs, eglandular hairs mostly confined to margins and midrib. *Involute* c. 6–10 mm diam., on peduncles manifestly exceeding upper leaves. *Bracts* 12–23, in 1 row but overlapping, mostly obovate, occasionally elliptic or ovate, 3.4–6.6 mm

long, 1.6–4.1 mm wide, apically acute to obtuse, mainly herbaceous, with very narrow laciniate hyaline margins and hyaline whitish or purplish apex, with a scattered to dense indumentum of stalked glandular hairs which are uniformly short or highly variable in length, some often manifestly longer than the rest, sometimes (subsp. *thompsonensis*) with long, eglandular septate hairs prominent. *Receptacle* initially subconical or conical but appearing hemispherical on reflexing of bracts (e.g. see *Williams* 78228), shortly honey-combed, glabrous. *Ray florets* c. 21–38; corolla 8.3–15.8 mm long, mauve or white. *Disc florets* c. 60–170; corolla tube 1.8–3.1 mm long, 5-lobed, yellow, externally with long, glandular hairs. *Stamens* 5; filament collar almost straight; anthers 1.1–1.9 mm long, microsporangia 0.88–1.42 mm long, apical appendages 0.19–0.45 mm long. *Style* c. 2.0–2.6 mm long; arms c. 0.9–1.4 mm long. *Cypselas* with the lateral surfaces almost flat to manifestly rounded and subcylindrical, fruit somewhat obovate (straight to asymmetric along the long axis) in outline, 1.9–2.9 mm long, 0.9–1.75 mm wide, initially brown but maturing to black, with scattered clear or whitish, sessile (?), globular glandular hairs about and immediately below the apex; lateral surfaces lacking longitudinal ridges but covered with coarse, rounded to somewhat subconical, variably distinct tubercles, which, if fused, may form irregular and somewhat transverse rows across the surface; tubercles c. 28–71 on each surface, (?) each terminating with a microscopic, curved, biseriate eglandular hair which is often lost at maturity; ab/adaxial margins smooth or with up to c. 10 small tubercles on each margin, in rounded fruit often almost obscuring margins; pericarp internally with sclerenchyma confined to the ab/adaxial ribs; vascular bundles 2, with 1 in each ab/adaxial rib; testa composed of evenly-thickened cells (*P.S. Short* 2433); carpopodium annular, whitish, narrow, barely 0.04 mm wide. *Pappus* a whitish or pale straw-coloured crown of c. 10–20 basally united, semi-erect to erect scale-like bristles or short bristles, mostly of about equal length, to manifestly uneven, individual elements c. 0.1–1.1 mm long. *Chromosome number*:  $2n = 12, 24, 30$ . **Fig. 5I, 11C, 40, 41.**

*Distribution.* Queensland, New South Wales and South Australia, ranging from about Longreach (Queensland) in the north to Renmark and Waikerie in South Australia. For more details see under subspecies.

As previously noted (*Short* 1999) I have seen no collections of this species which can be definitely attributed to Victoria.

*Habitat.* Commonly a species of clay or clay-dominated soils on river floodplains but also recorded, for example, from loam and sandy loam.

*Reproductive biology.* Pollen:ovule ratios determined from 15 capitula ranged from 3,190 to 6,365; estimates were determined from *P.S. Short* 3578, a population collected near Cunnamulla (Qld) and for which a haploid chromosome number of  $n = 6$  has been determined.



**Fig. 40.** *Brachyscome melanocarpa* subsp. *melanocarpa*, near Ennangonia, N.S.W. — *P.S. Short* 3563.

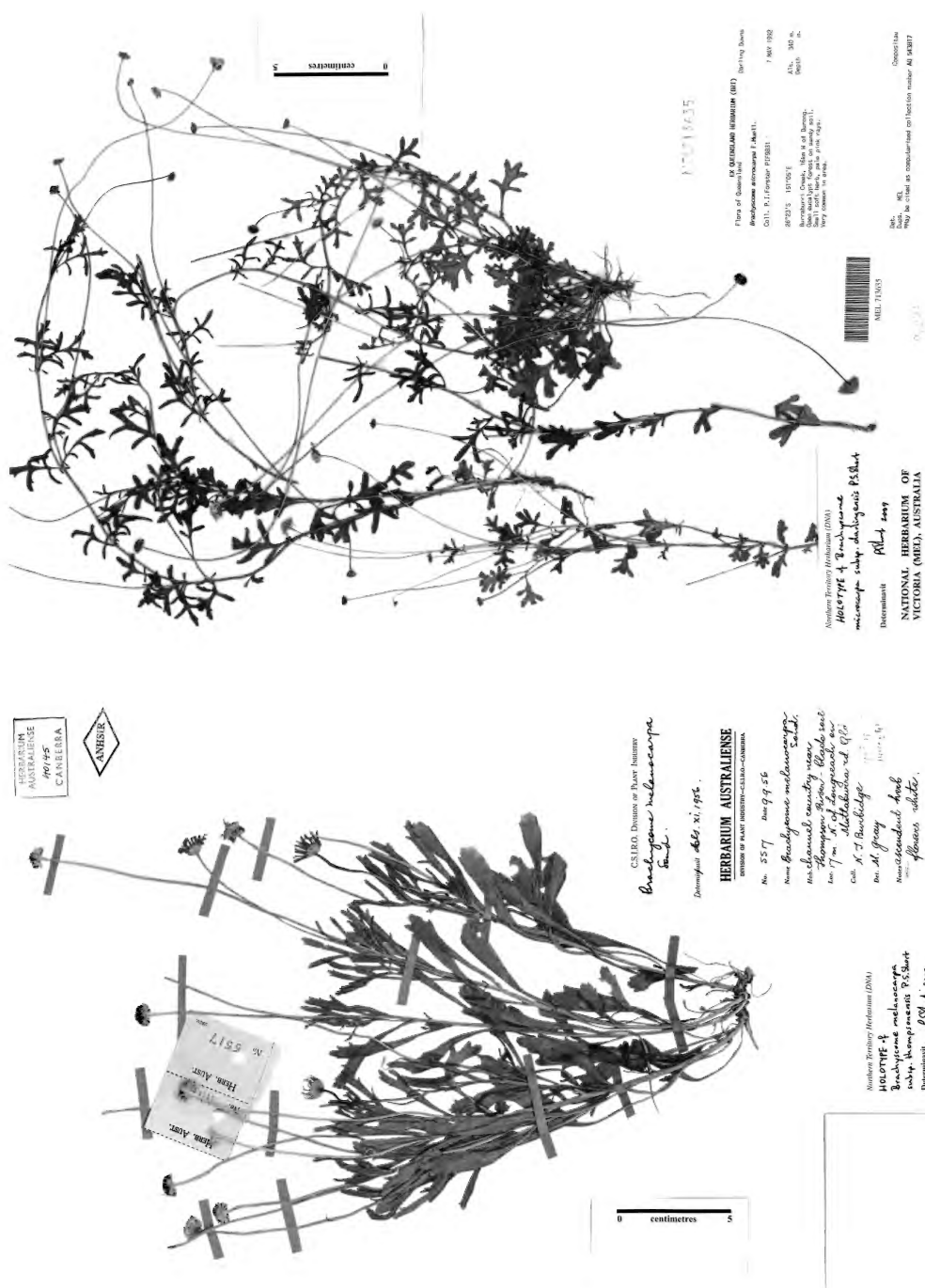
*Salkin et al.* (1995) indicated that seed germinates well in 8–30 days.

*Cytology.* *Smith-White et al.* (1970, Fig. 30, 41) reported a diploid complement of  $2n = 12$  in the vicinity of Charleville and Cunnamulla and much further south, at Menindee. At Bourke they recorded tetraploids ( $4n = 24$ ) and the occurrence of a pentaploid ( $2n = 30$ ) in an otherwise tetraploid population. From their voucher specimens in SYD it is apparent that  $n = 6$  was more widely recorded than perhaps the published results indicate; it was recorded from samples obtained 35 miles (?*Smith-White* 67/1369), 41 miles (?*Smith-White* 67/1374) and 109 miles (?*Smith-White* 67/1382) S of Charleville; 10 miles (*Smith-White & Carter* 5634) and 27 miles (*Smith-White & Carter* 5640) E of Cunnamulla; 9 miles W of Cunnamulla (*Smith-White & Carter* 5619); 9 miles (*Smith-White & Carter* 5615), 38 miles (*Smith-White & Carter* 5611) and 57 miles (*Smith-White & Carter* 5608, 5609A) S of Cunnamulla; 24 miles south of Saint George (*Smith-White & Carter* 5658); and 1 mile W of Talwood (*Smith-White & Carter* 5661).

Determinations reported in *Watanabe & Short* (1992) and *Watanabe et al.* (1996b) are consistent with observations by *Smith-White et al.* (1970). A somatic metaphase karyotype idiogram was published in *Watanabe et al.* (1999, Fig. 52).

*Typification.* Undoubted type material of *B. melanocarpa* exists on two sheets, MEL 115990 and MEL 115991, with annotations indicating that the material was once part of *Sonder's* herbarium. One of these sheets, MEL 115990, is simply labelled as being a *Mueller* specimen from the “Murray” and is the only one seen by *Davis* (1948), who clearly stated – and appropriately annotated the sheet – that she chose the largest of the three elements on the sheet as the lectotype specimen and regarded the remaining two as “lectoparatypes”. She also correctly noted that “unfortunately none of them [the elements] bear mature fruit, but the vegetative features exhibited





**Fig. 41.** Holotype of *Brachyscome melanocarpa* subsp. *thompsonensis* (CANB) N.T. Burbidge 55/7. **Fig. 42.** Holotype of *Brachyscome microcarpa* subsp. *darlingensis* (MEL), P.I. Forster 9831.

leave no doubt as to their identity" (Davis 1948, p. 180). Although Davis's choice of lectotype specimen was understandable and must stand there can be no doubt that had she seen the better material available on the sheet MEL 115991 her choice would have been different. This part of the original gathering not only includes mature fruit but also the original label on which it is recorded that Mueller collected it in February 1851 "In declivitatibus arenoso-calcaris supra Morunda[ii?]", the latter locality noted on the sheet by J.H. Willis as being "Limestone cliffs of Murray River above Moorundie", a location near Blanchetown in South Australia.

A specimen NY 00162721 viewed at the JSTOR website in August 2012 may well be of this species but has no type status, the specimen having been gathered by C. French in 1888; the species was named in 1853.

**Notes.** My observations suggest that the species may behave as an annual but commonly behaves as a perennial.

As circumscribed the species is morphologically variable across its range. For example, specimens from about Louth and Bourke to Cunnamulla tend to exhibit a far greater density of, and longer, eglandular septate hairs on the leaves than more southerly collections, in which eglandular hairs may almost be absent. Across the range there is also much variation in the indumentum immediately below the capitulum and on the outer surface of the bracts, while in regard to the cypselas, their general shape (size and degree of swelling), plus the number and distinctness of tubercles on the lateral surfaces is also highly variable, e.g. a collection by *Le Breton* (MEL 1581494), from 135 kms SE of Bourke, displays considerable variation in fruit size (2.1–2.9 mm long) and shape, as well as tubercle number, which varies from c. 28 to 70 tubercles on each lateral surface. The pappus is also variable, e.g. a small crown c. 0.1 mm high in some specimens but in others a more conspicuous crown in which individual elements are up to c. 1 mm long.

More thorough analyses of morphological and chromosomal variation may well indicate otherwise but I am not generally convinced that other entities are worthy of recognition or can be practically recognised. However, there is one exception to this. I have opted to recognise one geographically and morphologically distinct entity, the subspecies *thompsonensis*, from Queensland.

#### Key to subspecies of *B. melanocarpa*

1. Outer surface of involucre bracts with a sparse to dense indumentum of stalked glandular hairs (Fig. 51, 11C, 40) ..... **56a. subsp. *melanocarpa***
- 1: Outer surface of involucre bracts with a prominent indumentum of eglandular septate hairs c. 0.25–0.5 mm long, stalked glandular hairs absent or inconspicuous (Fig. 41) ..... **56b. subsp. *thompsonensis***

#### **56a. *Brachyscome melanocarpa* subsp. *melanocarpa***

*Involucre bracts* with a sparse to dense indumentum of stalked glandular hairs of equal or variable length,

eglandular hairs absent; bract margins irregularly and shallowly lacinate. **Fig. 51, 11C, 40.**

**Distribution.** Widespread in the drainage basin of the Darling River and its northern tributaries (e.g. Barwon, Bogan, Culgoa and Warrego rivers) and part of the Murray River system, and ranging from about Charleville and St George in Queensland, south-west through New South Wales to the Murray River north of Blanchetown in South Australia.

In New South Wales and Queensland specimens of this subspecies on the outer reaches of the Darling River catchment, near Yetman (*C.W.E. Moore 9117*) and Wyaga (*C.T. White BRI 330612*) respectively, seem to represent the most easterly distribution of the taxon.

#### *Selected specimens examined.*

**SOUTH AUSTRALIA:** Renmark, 3 Oct. 1915, *Anon.* (AD 97622274 p.p., ex J.M. Black herb.); Murtho Forest Reserve, Horseshoe Lagoon banks, 15 May 1989, *A.G. Spooner 11545* (AD); Waikerie, 26 Mar. 1910, *S.A. White* (AD 97930012).

**QUEENSLAND:** c. 32 km E of Eulo, 12 Sept. 1973, *R.J. Henderson 2026* (BRI); 24 km S of Surat on Carnarvon Hwy to St George, Oct. 1974, *P. Hind 658* (NSW); c. 1.5 km E of Cunnamulla, 16 Aug. 1989, *P.S. Short 3578* (BRI, MEL); 38 km W of Cunnamulla, 29 Aug. 1978, *K.A. Williams 78228* (AD, BRI).

**NEW SOUTH WALES:** 7 miles W of Louth, 7 Sept. 1971, *C.W.E. Moore 5887* (CANB); c. 1.5 km N of Tolarno, 8 Sept. 1981, *R.W. Purdie 2082* (CANB); c. 17 km S of Menindee, 5 Oct. 1984, *P.S. Short 2433* (AD, CANB, MEL, NSW).

#### **56b. *Brachyscome melanocarpa* subsp. *thompsonensis* P.S.Short, subsp. nov.**

**Type:** Queensland. Channel country near Thompson River, black soil. 17 miles N of Longreach on Muttaborra road. 9 Sept. 1956, *N.T. Burbidge 5517* (**holotype:** CANB 40145; **isotype:** AD 96427028).

*Involucre bracts* with a conspicuous indumentum of tapering, eglandular, septate hairs c. 0.25–0.5 mm long, shortly stalked glandular hairs mostly or only restricted to around the base of the bract; bract margins manifestly and irregularly lacinate. **Fig. 41.**

**Distribution.** Only known from the vicinity of Blackall and Charleville. Habitat details are absent from MacGillivray's collection which is simply recorded as coming from Blackall. However, it is evident from his account (MacGillivray 1929) of a journey during which this specimen was collected that MacGillivray camped for the night at a waterhole on the Barcoo the very day he left Blackall. This information, plus the fact that Burbidge's collection is from the channel country of the Thompson River, indicates that the subspecies occurs in the Thompson-Barcoo drainage basin.

**Etymology.** Reflecting the locality of the type specimen from the floodplain of the Thompson River.

#### *Additional specimen examined.*

**QUEENSLAND:** Blackall, Aug. 1928, *MacGillivray* (AD 98669093).

**57. *Brachyscome microcarpa* F.Muell.**

Fragm. 1: 50 (Jul. 1858) ("*Brachycome*"); Benth., Fl. Austral. 3: 513 (1867) ("*Brachycome*"); C.Moore, Handb. Fl. New South Wales 263 (1893) ("*Brachycome*"); Maiden & Betche, Census N.S.W. Pl. 196 (1916) ("*Brachycome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 176, Fig. 38, 44 (1948) ("*Brachycome*"); Stanley in Stanley & E.M.Ross, Fl. SE Queensl. 2: 513, Fig. 71P (1986); J.Everett in G.J.Harden, Fl. New South Wales 3: 159 (1992) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 144 (1995). — **Type citation**: "In pratis siccis praesertim collinis Australiae orientalis subtropicae." **Lectotype**: Brisbane River, Radius albus vel diluto caerulescens, July 1855, *F. Mueller* (MEL 220355 p.p.). (Davis 1948, p. 176, Fig. 38). **Isolectotypes**: K 000882175, MEL 220355 p.p. **Probable isolectotype**: K 000882178 (date lacking). **Remaining syntypes**: Burnett River, *F. Mueller* (K 000882177, MEL 712900).

*Brachyscome discolor* C.Stuart ex Benth., Fl. Austral. 3: 520 (1867) ("*Brachycome*"); C.Moore, Handb. Fl. New South Wales 263 (1893) ("*Brachycome*"); Maiden & Betche, Census N.S.W. Pl. 197 (1916) ("*Brachycome*"). — **Type citation**: "N.S.Wales, New England, *C. Stuart*; Clarence River, *Beckler*." **Lectotype**: New England, Mountains, the lower surface of the leaf always purple red, *C. Stuart* 271 (MEL 116007 p.p.). (Davis 1948, p. 176). **Isolectotypes**: MEL 116007 p.p. **Remaining syntypes**: New England, *C. Stuart* (K 000882174); nr Tenterfield, *C. Stuart* (K 000882173, via A.H. Riley); Clarence River, *H. Beckler* (MEL 116021), see note below. **Possible remaining syntypes or possible duplicates of remaining syntype specimens**: Stony Creek, Tenterfield, *C. Stuart* (MEL 116015); nr Tenterfield, *C. Stuart* (MEL 116023 p.p.); Timbarra, Oct. to Dec. *C. Stuart* 88 (MEL 692702, MEL 692717 and perhaps MEL 692716); New England, *C. Stuart* (MEL 116016).

?*Brachyscome* "superspecies *basaltica*", Species no. 3: Smith-White et al., Aust. J. Bot. 103, 113 (1970), see cytology notes below.

*Brachyscome* aff. *nova-anglica* (*A*): K.Watan. et al., Muelle-ria 9: 206 (1996), Fig. 1C labelled as *B. sp. aff. nova-anglica*; see cytology notes below.

*Brachyscome nova-anglica* C: K.Watan. et al. in D.J.N.Hind & Beentje, Compositae 1: 712, Fig. 25 (1996), see cytology notes below.

*Brachyscome* aff. *nova-anglica* cytodeme A: K.Watan. et al., J. Plant Res. 112: 147, Fig. 60 (1999), see cytology notes below.

Perennial and possibly annual *herb* with sprawling to weakly erect branches to c. 40 cm long, branches subglabrous to prominently glandular-hairy, stalked glandular hairs of variable lengths, c. 0.06–0.28 mm long (mostly similar or of distinctly variable lengths on the one plant), their stalks of about even width or tapering towards the glandular apex, at least biserial for most of their length, sometimes multicellular at base, commonly dense beneath capitulum, eglandular hairs apparently absent. *Leaves* basal and cauline, mostly alternate, uppermost leaves usually paired, mostly green, lower surface sometimes flushed purple, glabrous or almost so, or with a sparse to dense indumentum of stalked glandular hairs as on the branches, basal and some mid-cauline leaves tapering to distinct, often

very long, petiole-like bases, upper leaves with or without petiole-like bases; basal and lower-cauline and sometimes mid-cauline leaves spatulate or linear-oblongate in outline, 15–130 mm long, 5–25 mm wide, with c. 3–10 major lobes, lobes shallow, obtuse, or divisions extending to c. ½ way or more (in subsp. *darlingensis*) to the midrib, the resultant lobes acute to obtuse, all major lobes entire, or with 1 or more smaller teeth-forming incisions; mid-cauline leaves smaller than basal leaves, with or without a petiole-like bases, the depth of divisions about the same or deeper than in the basal leaves, resultant lobes mostly narrower and acute; upper leaves smaller but otherwise mostly similar to mid-cauline leaves. *Involute* c. 4–4.5 mm diam., on peduncles far exceeding uppermost leaves. *Bracts* 13–20 in c. 1 row, elliptic to narrowly elliptic, obovate to oblanceolate or ovate, 2.3–4.5 mm long, 0.9–1.8 mm wide, apically acute to obtuse, thinly herbaceous, with hyaline, sometimes purplish, margins which are distally entire or slightly serrated, reflexing at maturity, with a sparse to somewhat dense indumentum of stalked glandular hairs as on the scapes. *Receptacle* subconical, somewhat honey-comb-like, glabrous. *Ray florets* c. 34–47; corolla 3.5–8.1 mm long, 0.4–1.43 mm wide, apically rounded, entire or barely and minutely 1- or 3-lobed, veins usually 4 but not always all reaching to about the apex and joining and sometimes with one of 4 basally-derived veins dividing c. ½ way to form a 5<sup>th</sup> vein, rarely with 6 veins, corolla white, mauve or pink. *Disc florets* with corolla 1.3–2.2 mm long, 5-lobed, yellow. *Stamens* 5; filament collar 0.13–0.32 mm long, straight in outline or slightly dilating towards the base, basally not or barely wider than the filament; anthers 0.66–1.29 mm long, microsporangia 0.57–1.13 mm long, apical appendages 0.01–0.29 mm long (i.e. sometimes not or barely developed as in *M.D. Crisp* 2765, to well-developed), base obtuse; endothelial tissue radial; pollen grain number not determined. *Style* 1.7–3.3 mm long; arms 0.52–0.95 mm long, stigmatic part 0.17–0.58 mm long, appendages somewhat triangular to narrowly triangular in outline, 0.19–0.69 mm long, shorter to c. 3 times longer than the stigmatic part. *Cypselas* flat, obovate, straight, 1.05–2 mm long, 0.53–1.15 mm broad, lateral surfaces lacking ridges or very rarely somewhat distinct, yellow-brown to dark brown to black at maturity; lateral surfaces of cypselas body with c. 15–50 tubercles, tubercle with or without a whitish, eglandular biserial hair; eglandular biserial hairs 0.01–0.13 mm long, straight, curving along the length or apically not or slightly to distinctly curled (almost straight to barely apically-curved hairs may occur on some fruit, e.g. *Forster* 6761); multicellular, stalked glandular hairs sometimes present, 0.02–0.06 mm long, mostly about apex and base of the fruit, particularly so in immature fruit; ab/adaxial margins unwinged, lacking tubercles and smooth except for hairs which may or may not be present; pericarp with 2 vascular bundles; sclerenchymatous tissue restricted

to the ab/adaxial margins; testa cells evenly thickened (*L.H. Bird*, BRI 423944); carpopodium narrow, c. 0.03–0.06 mm (3 or 4 cells) wide, whitish. *Pappus* a barely discernible to distinct crown of bristles joined basally; bristles somewhat uneven in length, individual elements 0.02–0.4 mm long. *Chromosome number*:  $n = 5$ , 6. **Fig. 5D, 42** (of subsp. *darlingensis*).

*Distribution*. Eastern Queensland, south of c. 24°S (Gladstone area) and east of c. 150°E, and north-eastern New South Wales (mostly north of about Crescent Head).

*Habitat*. Predominantly a species of eucalypt woodland or forest on sand or loam and often associated with rocky outcrops.

*Reproductive biology*. Flowering specimens have been collected in all months, but the number of herbarium specimens gathered in each month suggests that flowering is most common from June to December, with November the peak month.

General observations of floral characteristics indicate that this species is likely to have a pollen:ovule ratio of several thousand and is commonly cross-pollinated. Indeed, a pollen:ovule ratio of 2,473 has been recorded for a specimen of subsp. *darlingensis*, while in five capitula from *P.S. Short* 3969 (also the voucher for a chromosome number determination of  $n = 5$ ) pollen:ovule ratios ranged from 1,661 to 1,764.

Salkin et al. (1995) did not record provenance of material trialled but noted that seed germinates in 15–40 days and that coastal forms of this species will sometimes layer.

*Cytology*. As here defined, *B. microcarpa* is not only morphologically but also chromosomally variable. Thus, Watanabe et al. (1996b) recorded  $n = 6$  for populations from Girraween N.P., Qld (*Watanabe* 80) and near Boonoo Boonoo, N.S.W. (*Short* 3970), with Watanabe et al. (1996a) and Watanabe et al. (1999, Fig. 54) publishing an idiogram of somatic metaphase chromosomes. Using the name “*Brachyscome* aff. *nova-anglica* (A)” Watanabe et al. (1996b: 206) also recorded  $n = 5$  and  $2n = 10$  for a population near Glen Aplin, Queensland, and an idiogram of somatic metaphase chromosomes of this entity was subsequently published in Watanabe et al. (1996a, Fig. 25, as “*B. nova-anglica* C”) and Watanabe et al. (1999, Fig. 60, as “*B. aff. nova-anglica* cytodeme A”).

As well as the above reports, Smith-White et al. (1970) recorded  $n = 10$  and  $10II + 4I$  for specimens collected near South Grafton, N.S.W. and attributed to this species. I have not seen a voucher specimen for this record. They noted that they had

collected a considerable amount of material which we provisionally identified as *B. microcarpa*. According to Davis (1948) this species has a range extending over south-eastern Queensland and north-eastern New South Wales in both coastal and highland regions. Some of our material has come from localities well to the south of this range.

Of our material only that from South Grafton has fruits which are morphologically close to the described type of the species, and we have identified this as *B. microcarpa*. We have been forced to give the other material identifying numbers, and consider them to be undescribed species of the superspecies *basaltica*, with affinities to *B. microcarpa* and *B. melanocarpa*.

Smith-White et al. (1970), p. 113

Of the species listed in Table 2 of their article both the cited localities (Drake, Glenn Innes and Torrington) and chromosome number determination of  $n = 6$  suggests that their “Species No. 3” is equivalent to what is here considered to be *B. microcarpa*.

*Syntype specimens* of *B. microcarpa*. Mueller, when describing this species in 1858, did not provide specific localities, merely noting that it is found in subtropical, eastern Australia. Davis (1948) subsequently selected a MEL specimen collected by Mueller from the vicinity of the Brisbane River in 1855 as the lectotype. At K there is a definite isoelectotype, the specimen consisting of six or seven plants mounted on the one sheet and with an original label which is in accord with that accompanying the lectotype specimen. A further sheet containing specimens of this taxon is also at K. It contains three separate collections, i.e. one a likely isoelectotype specimen which is undated but gathered by Mueller from the Brisbane River, and two other collections, one an undated collection apparently gathered by Mueller from the Burnett River and an undated Fawcett collection from the Richmond River. The Burnett River collection must have been gathered in 1855, is annotated by Mueller, and undoubtedly should also be considered to have been a syntype specimen. A duplicate of this is in MEL. Fawcett collections from the Richmond River are also in MEL (MEL 220251 & 220353), with a duplicate in NSW (NSW 15290); as with the K specimen they are undated and not annotated by Mueller (but MEL 220353 seen by Bentham) and therefore I do not regard them as syntype specimens. Leichhardt specimens of this taxon held at MEL (MEL 220349, 220350 & 116009) and gathered in 1843 were seen by Bentham but are similarly not annotated by Mueller. The lack of annotation, plus the observation by Blake (1955) that Mueller probably did not receive any Leichhardt specimens at MEL until shortly before July 1862 – the date Mueller first referred to any Leichhardt specimens in publication – also indicate that this specimen cannot be considered to have been a syntype of *B. microcarpa* F.Muell. (1858).

*Typification* of *B. discolor*. Davis (1948) chose a specimen at MEL as the lectotype specimen of *B. discolor*. She did this without having seen specimens at K and despite the fact that none of the six specimens of *B. discolor* at MEL collected by Stuart have a pencilled “B” on the reverse side of the label, this being the usual indication that Bentham saw specimens. This latter aspect suggests that a K specimen attributed to Stuart should be chosen as a new lectotype specimen.

However, the lectotype specimen chosen by Davis does have Stuart's original label recording "the lower surface of the leaf always purplish red". This information is not recorded on Stuart's specimen at K but is incorporated and attributed to Stuart in the original description. Thus, unless Bentham can be shown to have received this information from separate correspondence then I believe it should be assumed that he obtained it from the lectotype specimen chosen by Davis.

The lectotype specimen at MEL is clearly numbered as 271 and, other than the individual elements mounted on the same sheet and referred to by Davis as paratypes, there are no definite duplicate specimens.

At K there is a single sheet containing two distinct collections attributed to Stuart and originally forming part of Herbarium Hookerianum; one is from "nr. Tenterfield" and was donated by A.H. Riley, the other is labelled as "New England. C. Stuart". I assume that both were seen by Bentham and refer to them above as remaining syntypes. Otherwise, I simply list other Stuart specimens as possible remaining syntypes or possible duplicates of remaining syntype specimens. In this latter group there are five MEL specimens, four of which – as does the lectotype specimen – have the general "New England" locality on non-original labels in addition to other labels giving more precise localities but usually lacking collection numbers or dates of collection. They all lack any indication that they were seen by Bentham and of those listed, one of the two from Tenterfield and perhaps – because of their gross similarity to the "New England" specimen at K – those from Timbarra are duplicates of the specimens at K.

The label accompanying the apparent remaining syntype specimen (MEL 116021) from Clarence River is not annotated with the name of the collector, Beckler, and nor is it annotated by Bentham (only Davis has annotated it as "*microcarpa* F. Muell.") but – as indicated by the initial "B" on the reverse of the label – it was seen by him.

*Notes.* Although Bentham (1867) described *B. discolor* as a distinct species from *B. microcarpa* it appears that at one stage he was not going to. Specimens annotated as "New England, C. Stuart; Clarence River, Beckler" – the syntypes of the name *B. discolor* – were cited by him as examples of *B. microcarpa*, albeit that there are some additional specimens collected by Stuart from the New England area which he may have deemed to fit his concept of *B. microcarpa*. In any event, without comment, Moore (1893) and Maiden & Betche (1916) maintained both *B. discolor* and *B. microcarpa* as distinct species. However, Davis (1948, p. 178) reduced the name *B. discolor* to synonymy under *B. microcarpa*, commenting that, apart from some "small variation" in size, that fruit structure and shape are constant but that there "is in the leaves ... striking differences in shape". She further noted that there is "Complete graduation in shape of the lower cauline leaves ... from the toothed or pinnatifid leaves typical of specimens from the north

coast of New South Wales and elsewhere, to the orbicular and pinnatisect ones found in southern Queensland" and that "[A]ll intermediate shapes are found, apparently with no geographical basis." Salkin et al. (1995, p. 146) subsequently made reference to two unnamed forms and commented that there is much "obvious variation within *B. microcarpa*" and that "the species seems to include a number of entities, the status of which is unknown at present". This largely remains the case; I only formally name one distinctive entity – that referred to by Salkin et al. as "*Brachyscome* sp. (Darling Downs)" and which was included by Davis within her circumscription of *B. microcarpa* – but believe that more will eventually be recognised.

As will be evident from the above comments and description, leaves vary greatly in shape, including the extent to which they develop a petiole-like structure, and in the degree of division of the lamina; the general indumentum also varies, not just in the density of stalked glandular hairs but in the size of hairs. Similarly, there is variation in the size and colour of cypselas and, perhaps most importantly, in the eglandular hairs, which may be almost inconspicuous and straight to slightly curved, or comparatively much longer and manifestly apically-curved. There is also considerable variation in respect to the development of the terminal anther appendage; although well-developed in most specimens it is absent or at least very poorly developed in an entity, as represented by *M.D. Crisp* 2765 and *P.R. Sharpe* 3451, from Kroombit Tops at the northern end of the species' range (and perhaps as far south as about Brisbane) and in the entity described below as subsp. *darlingensis*. Another peculiarity in this species pertains to the apical stylar appendage. The ratio of the length of the stylar appendage to the length of the stigmatic surface generally varies little within any given species of *Brachyscome* s.lat. However, in specimens here attributed to *B. microcarpa* the ratio of appendage length to stigma length ranges from about 1:2 (0.18 mm : 0.37 mm in *F.M. Isaac* 1140) to 3:1 (0.69 mm : 0.23 mm in *R.W. Johnson* 2703). The latter specimen is representative of an apparently annual entity probably deserving of formal recognition. A further collection by Woolls from Mudgee, N.S.W. (MEL 692810, tentatively referred by Davis to *B. stuartii*), of a small, glandular hairy annual with black cypselas will also key to this species, but differs from the afore-mentioned collections of Isaac and Johnson; among others things the tuberculate faces of the cypselas have somewhat distinct longitudinal ridges.

Furthermore, contrary to Davis's comments, at least some of the observed morphological variation appears to have a geographical basis. As already mentioned, there is an entity in which specimens lack, or have barely formed apical appendages on their anthers, which comes from the north of the range of the species; the above-mentioned annual entity, represented by *R.W. Johnson* 584 and 2703 from the vicinity of Southwood

and Cracow respectively, occur, to the north and west of the bulk of other populations; specimens with wide, mostly glabrous, basal leaves and to which the name *B. discolor* at least partly applies occur in the southern half of the distribution (i.e. south of about Stanthorpe); while specimens with smaller and more dissected leaves are found in the north-east of the range, e.g. the Brisbane area. On the other hand, specimens with cypselas bearing apically-curved hairs appear to occur throughout much of the range.

I have not incorporated in the above description the attributes of a specimen *P.S. Brennan* (BRI 258024) which was collected between Miles and Wandoan in Queensland. The immature fruit have a short crown-like pappus typical of *Brachyscome* s.lat. and, if it does belong here, then it may have affinity with *B. microcarpa* s.lat. However, if so, it differs greatly in having a very large capitulum and much larger leaves than otherwise encountered.

I have little doubt that the acquisition of more material, population studies and morphometric analyses will see the formal recognition of a number of entities here included within *B. microcarpa*. I here refrain from doing so, with the exception of the subsp. *darlingensis* described below.

#### Key to subspecies of *B. microcarpa*

1. Plants mostly glabrous; majority of leaves with primary divisions extending at least  $\frac{3}{4}$  the way, and sometimes almost to, the midrib; anthers lacking apical appendages; cypselas black at maturity, with apically-inrolled, biseriate hairs; pappus a distinct but small crown (Fig. 5D, 42) . . . . . **57b. subsp. *darlingensis***
- 1: Plants never with the above combination of characters, the leaves not, or rarely a few, deeply divided, anthers usually with obvious anther appendages **57a. subsp. *microcarpa***

#### **57a. *Brachyscome microcarpa* subsp. *microcarpa***

*Notes.* Having recognised the subsp. *darlingensis* the remaining specimens within *B. microcarpa* s.lat. are technically attributable to subsp. *microcarpa*. As already outlined, the species here-defined as *B. microcarpa* is highly variable. Even with the removal of subsp. *darlingensis* it still contains some distinctive entities whose status needs further investigation. As such, I do not add here a brief description of what would constitute a highly variable subsp. *microcarpa* but merely refer readers to the above description of the species and notes concerning variation within it.

#### *Selected specimens examined.*

QUEENSLAND: Mount Greville, 4 Sept. 1988, *L.H. Bird* (BRI 423944, K, US n.v.); Lyra, 3 Nov. 1959, *S.T. Blake* 21090 (BRI); Kroombit Tableland, 3.2 km SSW of Amys Peak, 4 June 1977, *M.D. Crisp* 2765 (BRI, CBG n.v., L n.v.), anther appendages absent; Moonie River about 5 miles WSW of Southwood, 17 Sept. 1958, *R.W. Johnson* 584 (BRI), annual; Cracow–Eidsvold road 18 miles E of Cracow, 4 Sept. 1963, *R.W. Johnson* 2703 (BRI, CANB); Kroombit Tops, open forest, 16 Dec. 1983, *P.R. Sharpe* 3451 (BRI), anther appendage absent; 3 km S of Glen Aplin along highway to Tenterfield, 30 Jan. 1993, *P.S. Short* 3969 (CANB, MEL, NSW, TI); Indooroopilly, *J.H. Simmonds* (BRI 114339);

Taylor's Range nr Brisbane, July 1916, *C.T. White* (BRI 331308).

NEW SOUTH WALES: Casino, Apr. 1896, *E. Betche* (NSW 15291 & 15294); Bostock Road, Tucabia, 18 July 1983, *F.M. Isaac* 1140 (MEL); Gibraltar Range, 4 Dec. 1953, *R.W. Jessup & M. Gray* 3134 (CANB); Yamba Lighthouse Reserve, 2 Sept. 1993, *E. Salkin* 44 (MEL 2028620); c. 6 km S of Boonoo Boonoo along road to Tenterfield, 30 Jan. 1993, *P.S. Short* 3970 (AD, CANB, DNA, HO, MEL, NSW, TI).

#### **57b. *Brachyscome microcarpa* subsp. *darlingensis***

##### **P.S.Short, subsp. nov.**

**Type:** Queensland. Burraburri Creek, 16 km W of Dulong, 26°23'S, 151°05' E, open eucalypt forest on sandy soil, 7 May 1992, *P.I. Forster* 9831 (**holotype:** MEL 713635; **isotype:** BRI n.v.).

*Brachyscome* sp. (Darling Downs), E.Salkin et al., Austral. Brachyscomes 246 (1995).

Perennial herb, with mostly erect branches to c. 30 cm long, mostly glabrous but with very small glandular hairs at base of bracts and eglandular septate hairs at least sometimes present on shoots. *Basal leaves* often shallowly divided, at least most cauline leaves deeply lobed, with lobe-forming primary divisions extending at least  $\frac{3}{4}$  the way, and sometimes almost to, the midrib, resultant primary lobes entire or toothed. *Stamens* 5; anthers c. 1 mm long, microsporangia c. 1 mm long, apical appendages absent. *Cypselas* 1.2–1.5 mm long, 0.8–1.0 mm wide, black at maturity, eglandular biseriate hairs apically inrolled, 0.05–0.09 mm long. *Pappus* a distinct crown but not or barely c. 0.1 mm high. **Fig. 5D, 42.**

*Distribution.* Darling Downs region of Queensland.

*Habitat.* The few associated collection notes record "open eucalypt forest on sandy soil" (*P.I. Forster* 9831), "on shallow dark brown loam with stony outcrops. Lancewood, Gumtop-Box ridge" (*R.W. Johnson* 522), "on grassy creek bank" (*M.G. Lithgow*, BRI 284246) and "on brown sandy loam with *Acacia burrowii*" (*L. Pedley* 976).

*Phenology and reproductive biology.* Flowering and fruiting specimens have been collected in Mar.–May, July, Sept. and Oct. Salkin et al. (1995) reported that regularly pruned plants cultivated in subtropical climates flower throughout the year, while those cultivated in cool temperate climates flower from spring to autumn. A pollen:ovule ratio of 2,473 was recorded for a capitulum of *L. Pedley* 976; the capitulum consisted of 28 ray and 49 disc florets.

Salkin et al. (1995, as *Brachyscome* sp. Darling Downs) recorded that seed germinates in 7–20 days and that overnight soaking promotes germination.

*Etymology.* This taxon was first brought to public attention by Salkin et al. (1995) who referred to it as *Brachyscome* sp. (Darling Downs), and I continue the association with its locality by naming it subsp. *darlingensis*.

**Notes.** The polymorphic nature of the broadly-defined *B. microcarpa* has prevented me from giving this taxon specific status; more work may well support the belief of Salkin et al. (1995) that it is deserving of that rank.

*Additional specimens examined.*

QUEENSLAND: Lapunyah, 27 July 1958, R.W. Johnson 522 (BRI); junction of Dogwood and Wongongera creeks, Barakula State Forest, 27 Mar. 1982, M.G. Lithgow (BRI 284246); 14 miles east of Westmar, 11 Apr. 1962, L. Pedley 976 (BRI); Gurulmundi, 29 km NNW of Miles, 24 Aug. 1961, M.E. Phillips 377 & M.E. Phillips 377A (CBG); 2 km S of Miles on Condamine road, 4 Oct. 1996, K. Watanabe 633 (BRI n.v., MEL, TI n.v.); Bybera, 3 Sept. 1934, C.T. White 10143 (BRI).

**58. *Brachyscome multifida* DC., sensu Davis (1948)**

*Brachyscome multifida* DC., Prodr. 5: 306 (1–10 Oct. 1836) (“*Brachycome*”); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 182 (1948) (“*Brachycome*”), s.lat., incl. var. *multifida* and *dilatata*; J.H. Willis, Handb. Pl. Victoria 2: 670 (1973) (“*Brachycome*”), s.lat.; J. Everett in G.J. Harden, Fl. New South Wales 3: 162 (1992) (“*Brachycome*”), s.lat., incl. var. *multifida* and *dilatata*; E. Salkin et al., Austral. Brachyscomes 154–156 (1995), s.lat., incl. var. *multifida* and *dilatata*; P.S. Short in N.G. Walsh & Entwistle, Fl. Victoria 4: 850, Fig. 172b (1999), s.lat. — **Type citation:** “in umbrosis rupestribus Novae-Hollandiae int. ad Peel’s Range junio flor. legit. cl. Cunningham.” **Lectotype:** Shady rocky spots, Peel’s Range, Interior of New South Wales in latitude 34°S, 11.vi.1817, A. Cunningham (G-DC.). (Davis 1948, p. 181, pl. ix, no. 2). **Probable isoelectotypes:** K 000882172 (agrees with locality and date but one of several labels has the number ‘337’ not ‘41’ as in the lectotype), MEL 220761 (also numbered ‘337’), BRI 10104 p.p. (also numbered as ‘337’, the cypselas not of this species).

*Brachyscome glabra* Benth. in Endl. et al., Enum. Pl. Huegel 59 (Apr. 1837) (“*Brachycome*”) — **Type citation:** “Ferd. Bauer.” **Lectotype (here designated):** W, central element with capitulum, see notes. Isoelectotype: K 000882170, p.p.; see note.

*Brachyscome tenera* Benth. in Endl. et al., Enum. Pl. Huegel 59 (Apr. 1837) (“*Brachycome*”). — **Type citation:** “Ferd. Bauer.” **Types:** K 000882171, MEL 116003, W.

*Brachyscome tenera* var. *leptophylla* Benth. in Endl. et al., Enum. Pl. Huegel 59 (Apr. 1837) (“*Brachycome*”). — **Holotype:** W, see note under *B. tenera*.

*Brachyscome multifida* var. *dilatata* Benth., Fl. Austral. 3: 520 (5 Jan. 1867) (“*Brachycome*”). — **Type citation:** “Leaves thin, the lobes often broadly linear or cuneate. — *B. tenera* Benth. in Hueg. Enum. 59. Hunter’s River, R. Brown.”

*Brachyscome* aff. *multifida* cytodeme A: K. Watan. et al., J. Plant Res. 112: 147, Fig. 21 (1999).

*Brachyscome* aff. *multifida* cytodeme B: K. Watan. et al., J. Plant Res. 112: 147, Fig. 47 (1999).

Perennial *subshrub* or herb, major branches c. 10–40 cm long, decumbent to erect, with at least some forms spreading by layering, mostly glabrous or almost so, when present, hairs usually only stalked glandular hairs, commonly scattered, but some long, whitish eglandular hairs may be present on (usually) young growth. *Leaves* basal and cauline, 1.5–5.5 cm long, entire, linear, or more commonly, 1- or 2-pinnatifid, lobes long-linear

to short, tooth-like, glabrous or with scattered stalked glandular hairs (rarely non-glandular hairs present), segments apically blunt or mucronate. *Involute* 3.5–8 mm diam. *Bracts* c. 14–24, of equal length, in c. 1 row, obovate to oblanceolate, elliptic, lanceolate or somewhat oblong, 2.2–4 mm long, 0.65–1.7 mm wide, mostly herbaceous, with narrow scarious margins and apex, apex obtuse, surface glabrous but with glandular hairs usually extending from margins, bracts often strongly 3-veined, veins often somewhat orange-brown on drying. *Receptacle* somewhat concave, alveolate. *Ray florets* c. 21–34; corolla 5.1–12 mm long, 1.2–1.6 mm wide, usually 4-veined, apically obtuse or minutely 2- or 3-lobed, white, mauve or variably pinkish. *Disc florets* c. 34–60; corolla tube 1.5–2.7 mm long, 5-lobed, yellow, externally with scattered, long, glandular hairs, lobes with or without apical hairs. *Stamens* 5; anthers 1.03–1.43 mm long, microsporangia 0.82–1.16 mm long, apical appendages somewhat triangular, 0.12–0.31 mm long; pollen grains c. 3,400–4,300 per floret. *Style* c. 1.7–2.5 mm long; branches c. 0.63–1.07 mm long, sterile apical appendages shallowly to widely deltate, c. ½ to c. equalling the stigmatic part. *Cypselas* laterally compressed, obovate, 1.8–2.7 mm long, 0.85–1.1 mm wide, dark brown to black, lateral surfaces prominently tuberculate, eglandular hairs curved or weak and bifid, with the 2 branches equal or unequal, longitudinal ridges absent; ab/adaxial margins entire, rounded, smooth or variably tuberculate; pericarp with 2 vascular bundles, sclerenchyma confined to the ab/adaxial margins; testa cells with more or less evenly thickened walls (P.S. Short 3942); carpodium annular, pale brown or whitish. *Pappus* a crown of short bristles c. 0.1 mm high, sometimes absent or almost so. *Chromosome number:*  $n = 7, 9, 14$ . **Fig. 5F, 11D.**

**Distribution.** South-eastern Queensland, New South Wales, Victoria and possibly Tasmania.

The record for Tasmania is based on a single collection: Mt Barrow, Nov. 1906, Anon. (AD 97733582, ex herb. S.A. White). Whether or not White was the actual collector is unclear but he did visit Tasmania in 1906. Given the wide distribution of the complex, including southern Victoria, it is not inconceivable that *B. multifida* occurs in northern Tasmania but the absence of other collections from that State suggest the specimen label is incorrect.

**Phenology and reproductive biology.** Herbarium records indicate that flowering is mostly from September to February.

Pollen:ovule ratios ranging from 2,112 to 2,511 were determined for five individuals from a population (P.S. Short 3942) collected in Mt Kaputar N.P. in northern New South Wales.

At least some forms, e.g. as observed in the Grampians, spread by layering. Salkin et al. (1995) indicated that seed germination is often poor and may



take 15–40 days; for one variant they recorded good germination after 8–40 days.

**Cytology.** Chromosome numbers are variable within this complex, with  $n = 7, 9$  &  $14$  being reported.

Specimens referred to var. *multifida* by Smith-White et al. (1970, Fig. 35, 48, 49) were determined as having only  $n = 7$  at a number of localities in New South Wales and Queensland but both diploid and tetraploid plants were recorded at Goonoo State Forest and only tetraploids at Sally's Flat. In both tetraploid populations they recorded that meiosis was irregular, with some multivalent formation and that they were to some degree autopoloid.

Determinations of  $n = 7$  for *B. multifida* were also reported by Watanabe et al. (1996b) for populations from Glen Alpin, Qld (P.S. Short 3965), Warrumbungles National Park, N.S.W. (K. Watanabe 7) and Mt Kaputar National Park, N.S.W. (K. Watanabe 11). Watanabe et al. (1999, Fig. 47), using the name "*B. multifida* Cytodeme B", published an idiogram of somatic metaphase chromosomes of a plant from Mt Kaputar. This same figure was also published in Watanabe et al. (1996a, Fig. 19) under the name *B. multifida* var. *multifida*.

A chromosome number of  $n = 9$  has been determined for individuals from the Grampians in western Victoria and at Clover Flat in eastern Victoria (Smith-White et al. 1970, as *B. multifida* var. *dilatata*; Watanabe & Short 1992; Watanabe et al. 1996b; P.S. Short 3339 from the Grampians, unpublished). As evident from the label on a collection gathered near Ararat (B.L. Turner 5599), B.L. Turner also determined, but did not publish,  $n = 9$  for a member of this complex. Watanabe et al. (1999, Fig. 21) published an idiogram of somatic metaphase chromosomes under the name "*B. multifida* Cytodeme A", this being from P.S. Short 4021 from Clover Flat. This same figure was also published in Watanabe et al. (1996a, Fig. 18) under the name *B. multifida* var. *dilatata*.

**Typification of *B. multifida*.** The locality of Peel Range, as recognised today, is officially gazetted as  $31^{\circ}32'S$ ,  $150^{\circ}58'E$ . It is not the same locality from which Cunningham collected the type specimen of *B. multifida*, this locality being recorded by the collector as being in latitude  $34^{\circ}S$ . That the localities differ is confirmed by comparing the date of collection with the known route of Cunningham as published by McMinn (1970). Between the 3<sup>rd</sup> and 23<sup>rd</sup> June 1817, Oxley's exploration party – to which Cunningham was attached – travelled from Mount Binya at the southern point of the Cocoparra Range to the banks of the Lachlan River in the north. Thus, evidence suggests that the type specimen was gathered on the edge of the Cocoparra Range.

The original label accompanying the lectotype specimen at G-DC reads "Brachycome ciliaris C? (Bellis ciliaris, Labill.)? Shaded rocky spots Peel's range. Interior of New S. Wales in Lat.  $34^{\circ}S$ . 11 June 1817". To the left of this information, in heavier ink and seemingly added at a later date, is the number "41".

The probable isoelectotypes at BRI, K and MEL bear the number "337". Both numbers are shipping numbers related to the dispersal of specimens by Cunningham and the specimens are almost certainly part of the same collection (A.E. Orchard, pers. comm. 2013; Orchard & Orchard 2013; see also above).

The lectotype specimen, as examined in 2005, consists in part of an envelope containing two black fruit and the longest, linear leaf segment noted on the specimen was c. 19 mm long.

Davis (1948), referred to there being a lectoparatype, i.e. isoelectotype, on the same sheet as the lectotype and it is clearly annotated as such in Plate 9 of that work. Somewhat surprisingly, my notes from 1992 and 2005 made when I examined the lectotype make no mention of this supposed duplicate (which is also to be seen in the microfiche collection of G-DC) and I appear to have made no photographic record. In finalising this review I have concluded (as I suspect I had previously and which may explain the lack of notes) that that specimen, in exhibiting differently lobed leaves, is of another taxon and should be excluded as an isoelectotype.

The probable isoelectotype specimens in both MEL and BRI are woeful; that in MEL is part of a single branchlet containing only several damaged leaves with linear segments and the remnants of an old capitulum devoid of florets and fruit; that in BRI consists of several dried branchlets in similarly poor condition while the packet accompanying it contains three fruit which are clearly not of this species, nor indeed *Brachyscome* s.lat.

**Typification of *B. glabra*.** The single sheet at W containing undoubted type material of *B. glabra* consists of three elements. The element on the upper left is not the same as the other two; the upper right element lacks any capitula; the central specimen has a capitulum with some semi-mature fruit with an obvious carpodium and a reasonable cover of straight but weakish and at least sometimes bifid hairs; that is, at least the central element – which is the one element I here designate as the lectotype specimen of *B. glabra* – matches *B. multifida* in fruit morphology. The bracts also have orange-brown veins and the anthers have a definite terminal appendage. Both it and the right-hand element are virtually devoid of hairs, with only a few small, stalked glandular hair observed in leaf axils. The lectotype specimen is similar to the holotype of *B. tenera* var. *leptophylla* and – although I have not made direct microscopic comparisons with the type – other specimens such as *R. Story* 6643 from near Cessnock, and various collections from Hat Head.

My notes regarding the K specimen (K 000882170), that is the duplicate specimen taken to K by Bentham, indicate that of the two elements on the sheet, at least the one on the left hand side of the sheet is from a different gathering to the lectotype specimen, the bracts, leaves and stems often having a quite dense cover of shortly stalked glandular hairs while a cottony indumentum also occurs on parts of the leaves and stems. I assume, but

have not made a direct comparison, that the disparate element on the W specimen, i.e. the element of the left side, is the same. The identity of the discordant elements needs further checking; at the time I viewed it at K in 1992 I suspected it may be a form of *B. rigidula* s.lat.

*Typification of B. tenera.* Bentham, as part of his original description of *B. tenera*, recorded:

*Varietates duae occurrunt [sic], in una laciniae foliorum 2–3 lin. latae, in altera leptophylla, quae fortassis species propria, laciniae foliorum lineares, 1 lin. latae. In hac achaenia juniora tantum vidi, sed similia iis varietatis primae videntur.*

Bentham (1837), p. 59

Translated (by C.E. Short), this reads as

Two varieties occur, in one the flaps of the leaves are 2–3 lines wide, in the other *leptophylla*, which perhaps/possibly/probably is the species specially/proper/characteristically the flaps of the leaves are linear and 1 line wide. In this [*leptophylla*] I have only seen younger achenes, but they are seen to be similar to those of the first variety.

I have examined authentic type material of *B. tenera* on visits to both K and W and have also examined a specimen at MEL, the latter originally part of O.W. Sonder's herbarium and fragmentary, consisting of just several leaves and half of an immature capitulum which shows the subconical receptacle and immature florets.

There are two sheets in W, both containing two elements (branchlets). On one sheet the leaves are generally much wider than those on the other and this is consistent with Bentham's observations of there being two varieties, although both sheets are simply annotated as being of *B. tenera*. The K specimen contains a single element with broadly lobed leaves while the MEL collection has both broadly lobed and narrowly lobed leaves.

Elements of all sheets at K, MEL and W have immature fruit and it was only in the element of the right-hand side of the broad-leaved specimen in W that I could be confident that tubercles were developing; hairs could not be observed on the cypselas of any specimens, at least in part because of the presence of mould. There is also no evidence of the development of a wing on the ab/adaxial margins nor of longitudinal ridges on the lateral surfaces. Elements from all sheets are similar in that the stems, leaves and bracts are glabrous or almost so; none have eglandular hairs and stalked glandular hairs are few, only recorded in any number on a leaf in the K material. Apices of leaf segments are acute. I have no record of the bracts for the K specimen but the bracts of the elements of both sheets at W and that at MEL have whitish margins and orange-brown venation; I also recorded for one W sheet that the receptacle is subconical, as is the case for the MEL duplicate. Although difficult to distinguish it is evident that some of the hairs of the immature cypselas from the MEL type have weakly erect, eglandular, very shortly bifid hairs.

My impression when examining specimens at W was that the elements on both sheets were probably of the one taxon. Since then I have examined specimens from

the locality where I believe Bauer may have obtained his specimens. After his monumental voyage with Flinders, Bauer collected and illustrated in the Sydney region and is on record as having visited the Hawkesbury region in September 1803 and the Hunter Valley and Newcastle district in March–April 1804 (Mabberley 1999, Vallance et al. 2001). Having sorted specimens here attributed to this complex I believe that both W sheets are probably of the same taxon and that the original specimen was likely to have been collected in the vicinity of Newcastle, sheets such as *R.H. Cambage* (NSW 229603), *A.A. Hamilton* (NSW 229592) and *J.H. Maiden* (NSW 229906) exhibiting a range of leaf variation reasonably consistent with that seen in W specimens. However, the acute lobes of the leaves are not as pronounced in the above specimens, nor are their most widely lobed leaves as large as those exhibited in some of the elements which compose the type collection. Furthermore, the mature hairs on specimens such as the above are long-bifid, not shortly bifid as seen on the immature cypselas on the MEL type. Thus, I cannot unequivocally state that such specimens are definitely representative of the name *B. tenera*.

Presumably Bentham's statement must be read as being a deliberate naming of a new variety, i.e. *B. tenera* var. *leptophylla*. Given his description I believe that the type specimen, indeed the holotype, has to be the sheet in W which consists of the two fine-leaved elements. The type of the autonym, var. *tenera*, is open to lectotypification.

*Notes.* A highly polymorphic complex in which there are undoubtedly entities worthy of formal description and naming. The most obvious variation is in leaf morphology – entire and linear in some specimens, not just variously divided – some of which is excellently illustrated by Gloria Thomlinson in Salkin et al. (1995) and is evident in the various cultivars available in the horticultural trade. However, among other things, the presence or absence of apically bifid hairs also appears to be important; in what I assume to be typical *B. multifida* (and also in the type of *B. glabra*) some cypselas have apically forked hairs while the hairs are often or perhaps always non-bifid in other specimens.

Davis recognised two varieties of *B. multifida*, i.e. var. *multifida* and var. *dilatata*, the former found chiefly in the western districts and northern tablelands of New South Wales, the latter name encompassing populations found in an arc from the north-eastern coast of New South Wales through eastern Victoria and on to the Grampians in western Victoria. Of var. *dilatata*, she noted that it

shows considerable variation in the dimension of the leaf-segments. On the one hand are the broad, apparently flaccid leaves, almost palmately divided, and on the other are leaves approximating in appearance to var. *multifida*, all intermediate conditions being found. The two varieties can be distinguished by the fact that the leaf-segments of var. *multifida* are always relatively long and narrow-linear, tapering imperceptibly to an acute apex, while those of

var. *dilatata*, though very variable in relative proportions, are comparatively broad proximally and abruptly tapered distally.

Davis (1948), p. 183

Smith-White et al. (1970), when reporting on the cytology of the genus, also recorded considerable variation in regard to the var. *multifida*. Thus, tetraploid ( $n = 14$ ) plants at Sally's Flat were recorded as having fine, slender stems, "relatively sparsely lobed leaves" – indeed, they are usually entire and linear – and pale pink ray corollas, while tetraploid plants in Goonoo State Forest were described as having robust stems, "normally divided" leaves and blue ray corollas. In regard to the tetraploid plants it was also noted that

[I]n meiotic behaviour both the tetraploid populations ... are in some degree autopoloid, meiosis being irregular with some multivalent formation

Smith-White et al. (1970), p. 113

In regard to the var. *dilatata* they also noted that a population from Smoky Cape with  $n = 7$  differs in general morphology

no more strikingly from typical var. *multifida* than do some of the forms within that variety. Either the east coast *dilatata* should not be maintained or else several different varieties should be recognised within the species

Smith-White et al. (1970), p. 113

The specimen from Smoky Cape referred to by Smith-White et al. does not appear to have been vouchered or, if it was, has been lost. Thus, there must be some uncertainty as to its identification. However, there are other collections from that general vicinity, including *Barnsley 1109* and also several from Hat Head. Salkin et al. (1995, pp. 49, 156, 157) referred to specimens from the latter locality as both *Brachyscome multifida* (Hat Head) and *Brachyscome* aff. *multifida*.

I have merely determined specimens as belonging to *B. multifida* DC., sensu Davis (1948), only giving some brief notes above concerning the likely application of the names *B. glabra* and *B. tenera*.

#### 59. *Brachyscome nova-anglica* G.L.R.Davis

Proc. Linn. Soc. New South Wales 73: 178, Fig. 39, 45, 46, pl. vi, map 15 (1948) ("*Brachyscome*"); J. Everett in G.J. Harden, Fl. New South Wales 3: 159 (1992) ("*Brachyscome*"), p.p.; E. Salkin et al., Austral. Brachyscomes 166 (1995), at least in part. — **Type citation**: "*Holotype*: Dumaresq Creek, near Armidale, 'forest land', 23.11.1941, G. L. Davis (NSW). *Paratypes*: Two, l.c. (MEL, NSW)."  
**Holotype**: NSW 15318. **Isotypes**: BRI 10108, MEL 239621.

*Brachyscome nova-anglica* A: K. Watan. et al. in D.J.N. Hind & Beentje, Compositae 1: 712, Fig. 22 (1996), see chromosome note below.

Perennial herb, vegetative parts with an occasional sparse but mostly dense indumentum of stalked glandular hairs c. 0.06–0.88 mm long on vegetative parts, hairs septate and biseriate (at least for most of their length), barely to manifestly tapering to their seemingly minute glandular tip, sometimes the longest hairs possibly eglandular, hairs usually unequal in

length, with the longest frequently conspicuously longer than the rest. *Leaves* basal and cauline, alternate, oblanceolate, 8–44 mm long, 1.7–16 mm wide, mostly tapering to the base but sometimes slightly dilated in at least some upper cauline leaves, uppermost cauline leaf may be entire (and very small) but leaves usually with (1) 2–7 apically acute, entire teeth or lobes, the divisions mostly extending to no more than c.  $\frac{1}{2}$  way to the midrib, all teeth and lobes commonly in the distal  $\frac{1}{2}$  but sometimes with 1 or 2 basally, most leaves of similar shape but slowly to manifestly decreasing in size along stems; indumentum similar to that on stems. *Involucre* 4–6.5 mm diam. *Bracts* 14–17, in about 1 row, obovate to oblanceolate or elliptic, 2.6–4.5 mm long, 0.6–2.4 mm wide, apices and margins hyaline, stalked glandular hairs on outer surface and margins. *Receptacle* subconical, epaleate, areolate, glabrous. *Ray florets* 18–27; corolla 7–11 mm long, 1.2–2.1 mm wide, with scattered glandular hairs proximally; usually white, occasionally recorded as pale pink, pale mauve or purple; veins (3) 4 (5); apex not or minutely 2- or barely 3-lobed. *Disc florets* 38–61, corolla 1.8–2.6 mm long, yellow, tube with scattered glandular hairs externally; lobes 5, lacking erect apical hairs externally. *Stamens* 5; anthers 1.23–1.54 mm long; microsporangium 0.96–1.05 mm long; apical appendage 0.24–0.34 mm long; endothelial tissue with radial thickening; filament collar straight in outline, basally not thicker than filament. *Style* c. 1.8–2 mm long; arms 0.62–0.94 mm long; appendages triangular, 0.35–0.45 mm long; stigmatic surface 0.2–0.43 mm long, shorter than the appendage. *Cypselas* monomorphic, 1.4–2.1 mm long, 0.8–1.05 mm wide, brown-black to black, lateral surfaces tuberculate, eglandular hairs seemingly absent, or if present few, scattered,  $\pm$  straight and to only c. 0.05 mm long, stalked glandular hairs c. 0.04 mm long often present; pericarp with 2 vascular bundles, secretory canals absent; carpodium distinct, annular. *Pappus* a minute crown, the longest elements barely 0.06 mm long. *Chromosome number*:  $n = 7$ . **Fig. 5H.**

*Distribution*. As the specific epithet indicates, this species primarily occurs in the New England region of New South Wales, with most populations found north of about Armidale and extending along the Dividing Range to just over the Queensland border where it is known from Girraween N.P. A population from Mt Lindesay in the Mt Kaputar N.P. represents a disjunction from the general distribution.

*Cytology*. Smith-White et al. (1970, Fig. 34) recorded  $n = 6$  and 7 for specimens they attributed to this species and Watanabe et al. (1996b) recorded  $n = 5$ , 6 and 7, referring to *B. nova-anglica* s.str. as having  $n = 7$ , "*B. aff. nova-anglica* (A)" as  $n = 5$ , and "*B. aff. nova-anglica* (B)" as  $n = 6$ . Here I exclude populations with  $n = 5$  and 6 from *B. nova-anglica*; those with  $n = 6$  being described as *B. tamworthensis* and those with  $n = 5$  referred to a broadly-defined *B. microcarpa*.

The determination of  $n = 7$  has been recorded for collections from Ebor, Guyra and Wongwibinda in N.S.W. and Girraween N.P. in Qld. An idiogram of somatic metaphase chromosomes of this taxon was published by Watanabe et al. (1996a, Fig. 22, as "*B. nova-anglica* A") and Watanabe et al. (1999, Fig. 48).

**Phenology and reproductive biology.** All flowering specimens of this species have been collected from October to April, with peak collecting in December, January and April.

From five capitula of *P.S. Short 3978* estimates of pollen:ovule ratios ranged from 2,454 to 3,765.

**Conservation note.** Found in Girraween National Park and perhaps other reserves.

In a note dated 4 Dec. 1961 and attached to a specimen (NSW 229674) the collector D. O'Grady recorded that

... this plant has been common in all wild pastures here at Seelands and in other parts of the district such as Whiteman Creek, Lawrence etc., as long as I can remember, unfortunately cattle eat it out greatly so it is not as common as previously, still one could not go on a walk in Spring here at Seelands without seeing a few plants.

**Notes.** Ray corollas are mostly 4-veined. Of 25 randomly sampled ray florets 16 had four veins, six had three veins, two had 5 veins and one had six veins. When 5 veins were present one vein was poorly developed and did not reach the apex, when six veins were present the 4 central veins joined just below the apex and the outer two veins failed to reach the apex and did not join with other veins.

When describing *B. nova-anglica* Davis recorded this species to be

exceptionally well-defined, and can be identified with certainty in the absence of fruit. It is most clearly allied to *B. melanocarpa* both in vegetative features and fruit structures, but the general shape of the leaves in both species is quite distinct ... [and] the size of the fruit is intermediate between that of *B. melanocarpa* and *B. microcarpa*, but in constant presence of smooth margins and somewhat flattened appearance shows definite affinities with *B. microcarpa*. It would seem that in structure as well as range, *B. Nova-Anglica* [sic] occupies an intermediate position between the two species.

Davis (1948), p. 179

In regard to the close relationship of the aforementioned species I concur with Davis, but in regard to it being "exceptionally well-defined" I do not. Smith-White et al. (1970) first drew attention to the presence of two chromosomal forms ( $n = 7$  and  $n = 6$ ) – but could not distinguish the two morphologically – while Watanabe et al. (1996b) recorded determinations of  $n = 5, 6$  and  $7$  for the species. The undoubtedly closely related entity with  $n = 5$  is elsewhere in this paper referred to *B. microcarpa* s.lat., while contrary to Smith-White et al. I believe there are good morphological features to separate specimens with  $n = 6$  as a new species, *B. tamworthensis*. As well as the morphological and chromosomal differences between the two taxa they also

have essentially discrete distributions, although both are recorded from Mt Kaputar National Park. Specimens of both species are readily distinguished by the features outlined in the above key and in the treatment of *B. tamworthensis*.

#### *Selected specimens examined.*

QUEENSLAND: Castle Rock camping area, Girraween N.P., 29 Jan. 1993, K. Watanabe 79 (BRI, MEL, NSW, TI).

NEW SOUTH WALES: Serpentine River, New England, 31 Jan. 1941, G.L. Davis (AD 97631363, BRI 331360, MEL 239623, NSW 15326, PERTH 419869); 3 km N from entrance to Cathedral Rock N.P., 4 Feb. 1996, M. Ito 96019 (MEL); c. 26.5 km SE of Wongwibinda along road to Ebor, 31 Jan. 1993, P.S. Short 3978 (CANB, MEL, NSW, TI).

#### 60. *Brachyscome stuartii* Benth.

Fl. Austral. 3: 513 (1867) ("*Brachyscome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 156, Fig. 7, 11, pl. vi, map 4 (1948) ("*Brachyscome*"); Stanley in Stanley & E.M.Ross, Fl. SE Queensl. 2: 511, Fig. 71M (1986); J.Everett in G.J.Harden, Fl. New South Wales 3: 161 (1992) ("*Brachyscome*"); E.Salkin et al., Austral. Brachyscomes 224 (1995). — **Type citation:** "New England, C. Stuart." **Lectotype:** New England, C. Stuart 14 (MEL 220554 p.p.). (Davis 1948, p. 156). **Isolectotype:** MEL 220554 p.p. **Probable remaining syntypes:** "No. 14 in last sending", C. Stuart (MEL 220554 p.p.); New England, "Seed of 14 in last", C. Stuart (NSW 15122, ex MEL), see notes below. **Remaining syntypes:** New England, C. Stuart (K 000882224); Mts 1000 ft, C. Stuart 152 (MEL 220554 p.p.); Mts, C. Stuart 204 (MEL 220554 p.p.); Mountains, C. Stuart 264 (MEL 220554 p.p.). **Remaining isosyntype:** New England, C. Stuart (MEL 220553), see notes below.

There are difficulties in the application of the names *B. dissectifolia* and *B. stuartii*; for notes see under number 55, *B. dissectifolia*. No description is provided here but for an illustration of a fruit see Fig. 5A.

**Distribution.** North-eastern New South Wales and the adjoining Darling Downs region (e.g. Stanthorpe) of Queensland.

**Reproductive biology.** Salkin et al. (1995) recorded that germination takes from 7–50 days.

**Cytology.** Chromosome number determinations of  $n = 6$  and  $2n = 12$  for this species have been recorded from populations in Girraween N.P. in Queensland and from Gibraltar Range N.P. and the vicinity of Deepwater, Emmaville and Glen Innes in New South Wales (Smith-White et al. 1970, Fig. 3 & 14; Watanabe et al. (1996a) and Watanabe et al. (1999, Fig. 53) presented an idiogram of somatic metaphase chromosomes.

**Typification.** The lectotype specimen chosen by Davis is a single element on a sheet containing four separate gatherings by Charles Stuart, i.e. C. Stuart 14, 152, 204 & 264. At the bottom left corner there is what I assume to be a general encompassing label for all such specimens and which simply states "Brachyscome! New England C. St.". On the back left of the label there is a pencilled "B" indicating that Bentham had seen the specimens and I

believe it reasonable to assume, as must have Davis, that Bentham examined all of this material. With Davis having selected the lectotype specimen (*C. Stuart 14*) *C. Stuart 152, 204 & 264* are remaining syntypes.

The collection *C. Stuart 14* definitely consists of two elements, the element which is part of a plant with a single flowering capitulum and is clearly marked in pencil as the lectotype specimen by Davis, and the neighbouring element which is a piece of plant which has lost any capitulum which may have been attached at the time of collection and which is marked in pencil by Davis as a paratype and is an undoubted isoelectotype. There is also another element which may or may not be an isoelectotype. Immediately above the lectotype specimen there is an envelope containing fruit and three capitula and which is labelled as "No. 14 in last sending". This indicates that the seed were sent to Mueller at a later date and may not be part of the same gathering and, therefore, not an isoelectotype but a remaining syntype. A further specimen, NSW 15122, is originally from MEL and has a blue label attributing it to "New England C. St." and the initial "B" on the back left corner, while the original label attached to the plant (to which two, now seedless but mature capitula are attached) is annotated "Seed of 14 in last"; again it may be from the one gathering sent at a later date but the fact the the plant has mature capitula and that the leaves have broader lobes than the lectotype specimen strongly suggests that it is part of a separate gathering to the lectotype specimen.

Another specimen, MEL 220553, contains five plants, each with a capitulum, and has an old "Phytologic Museum of Melbourne" label simply indicating "Brachyscome New England, C. St." There is no indication that it was seen by Bentham and I therefore consider it to be a remaining isosyntype.

At K there is a single sheet containing two collections; one collection consists of two plants with the label "New England C. Stuart" (K 000882224), the other consists of a single plant labelled "nr Tenterfield N.S.W. Coll. C. Stuart From A.R. Riley Esq" (K 000882223). Both are stamped Herbarium Hookerianum 1867, with Bentham's publication of the name *B. stuartii* in January of the same year. This last fact casts some doubt on whether Bentham saw either specimen when compiling the description although it may simply reflect a lag in mounting. I have opted to consider the "New England" specimen as a remaining syntype.

#### 61. *Brachyscome tamworthensis* P.S.Short, *sp. nov.*

**Type:** New South Wales. Mt Kaputar N.P., 1.2 km from Green Camp Picnic site along road to Mt Kaputar, 28 Jan. 1993, P.S. Short 3958 (**holotype:** MEL 2014652; **isotypes:** AD, CANB, NSW, TI).

*Brachyscome* aff. *nova-anglica* (B): K.Watan. et al., Muelleria 9: 206 (1996), see cytology notes below.

*Brachyscome nova-anglica* B: K.Watan. et al. in D.J.N.Hind & Beentje, Compositae 1: 712, Fig. 23 (1996), see cytology notes below.

*Brachyscome* aff. *nova-anglica* cytodeme B: K.Watan. et al., J. Plant Res. 112: 147, Fig. 49 (1999), see cytology notes below.

[*Brachyscome nova-anglica* auct. non G.L.R.Davis: Smith-White et al., Aust. J. Bot. 111, 113, Fig. 33 & 47 (1970) p.p., as to specimens from Walcha.]

Perennial *herb* with ascending to erect branches, up to c. 25–30 cm long, but frequently mature plants much shorter, vegetative parts with a somewhat dense indumentum of shortly stalked glandular hairs, hairs 0.04–0.12 mm long, not manifestly disparate in length. *Leaves* basal and cauline, alternate, linear-oblongate to oblanceolate in outline 4.5–50 mm long, 1–11 mm wide, basal and lower cauline leaves tapering to distinct petiole-like bases, lower part of mid- and upper-cauline leaves tapering but not petiole-like, otherwise leaves generally similar in morphology although reducing in size distally, uppermost cauline leaf often entire, otherwise leaves with (1) 2–9 apically acute, entire teeth or lobes, lobe-forming divisions mostly extending c. ½ way or less to the midrib, teeth and lobes commonly in the distal half but sometimes with 1 or 2 basally; indumentum similar to that on stems. *Involucre* c. 3.5–5 mm diam. *Bracts* c. 11–15, in about 1 row, ovate, elliptic, or obovate to barely oblanceolate, 2.7–3.9 mm long, 1.2–1.9 mm wide, apices and margins hyaline, stalked glandular hairs usually dense abaxially. *Receptacle* subconical, areolate, glabrous. *Ray florets* c. 17–27, in 1 or 2 rows; corolla 4.7–5.7 mm long, 1–1.6 mm wide, with scattered glandular hairs basally, white; veins 4 or 5, sometimes with a partial 6<sup>th</sup> vein running c. ½ the length; apex not or minutely 2- or 3-lobed. *Disc florets* 19–32, corolla 1.5–2.2 mm long, yellow, tube with scattered glandular hairs externally; lobes 5, lacking erect apical hairs externally. *Stamens* 5; anthers c. 1.05–1.5 mm long; microsporangium c. 0.7–1.16 mm long; apical appendage 0.26–0.34 mm long; endothelial tissue with radial thickening; filament collar straight in outline and basally not thicker than filament, 0.2–0.26 mm long. *Style arms* 0.73–0.88 mm long; apical appendages somewhat triangular, 0.36–0.52 mm long, equalling or longer than stigmatic surface which is 0.32–0.4 mm long. *Cypselas* essentially obovate in outline and laterally flattened, sometimes surfaces slightly swollen and fruit almost subcylindrical, straight or occasionally very slightly curving along long axis, 1.3–1.8 mm long, 0.6–0.8 mm wide, brown when immature, maturing blackish-brown or black, tubercles to c. 20–30 per lateral surface but often obscure, eglandular hairs c. 0.05–0.08 mm long, apically-curved, occasionally a few stalked glandular hairs c. 0.02 mm long present; pericarp with 2 vascular bundles, secretory canals absent; testa cells with evenly thickened walls; carpopodium narrow, annular, white. *Pappus* absent or at least little more than a dehiscence zone between the corolla and the fruit, 0.02–0.05 mm long. *Chromosome number:*  $x = 6$ . **Fig. 5G, 43, 44.**

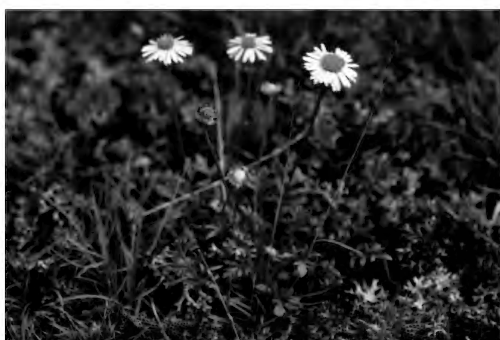


Fig. 43. *Brachyscome tamworthensis*, Mt Kaputar N.P. (type locality) — P.S. Short 3958.

**Distribution.** North-eastern New South Wales where it is mostly restricted to a small region centred about Tamworth, with populations found to the east at Walcha, to the south at Nundle and to the north-east and — somewhat disjunctly — in Mt Kaputar N.P.

**Habitat.** From limited observations and collectors' notes the species favours *Eucalyptus*–*Callitris* forest on sandy soil over granite substrates.

**Phenology and reproductive biology.** Herbarium specimens have been collected in January, May, June, September, October and November, suggesting spring-summer flowering is the norm but that sporadic flowering may occur throughout much of the year.

The pollen of five disc florets from different plants of P.S. Short 3958 collected in spirit, but not retained, were examined to estimate pollen:ovule ratios. Three plants examined appeared to have predominantly, if not only, fertile pollen, the number of pollen grains recorded being 4,652, 4,967 and 5,236, with the respective pollen:ovule ratios being 2,523, 2,247 and 2,291. The two other plants produced 3,052 and 1,576 grains but the small and somewhat shrivelled nature of the grains, particularly in the plant with 1,576 grains, suggested high if not complete sterility; in the plant with fewer grains the microsporangia were also small (0.7 mm compared to c. 1–1.2 mm in all others), while in the plant with 3,052 grains the style had three arms.

**Cytology.** Under the name “*Brachyscome* aff. *nova-anglica* (B)” Watanabe et al. (1996b) recorded  $n = 6$  and  $2n = 12$  for this taxon from a single population collected from Mt Kaputar N.P. (Watanabe 9) and an idiogram of somatic metaphase chromosomes was subsequently published in Watanabe et al. (1996a, Fig. 23, as “*B. nova-anglica* B”) and Watanabe et al. (1999, Fig. 49, as “*B. aff. nova-anglica* cytodeme B”). Smith-White et al. (1970, Fig. 33 & 47), using the name *B. nova-anglica*, recorded  $n = 6$  and  $3n = 18$  for specimens (Anon. 3260, 3262A; SYD) collected east of Walcha. In regard to the triploid plants they recorded that three of each kind of chromosome was identifiable in their karyotypes, and

that at diplotene there were six trivalents at maximum association, observations indicating that plants are autotriploids.

**Etymology.** A reflection of the distribution of the taxon in the Tamworth region.

**Notes.** This species differs from *B. nova-anglica* in having a general indumentum of shortly stalked glandular hairs which are 0.04–0.12 mm long, in having comparatively swollen cypselas with eglandular, apically-curved hairs, and a base chromosome number of  $n = 6$ .

*Additional specimens examined.*

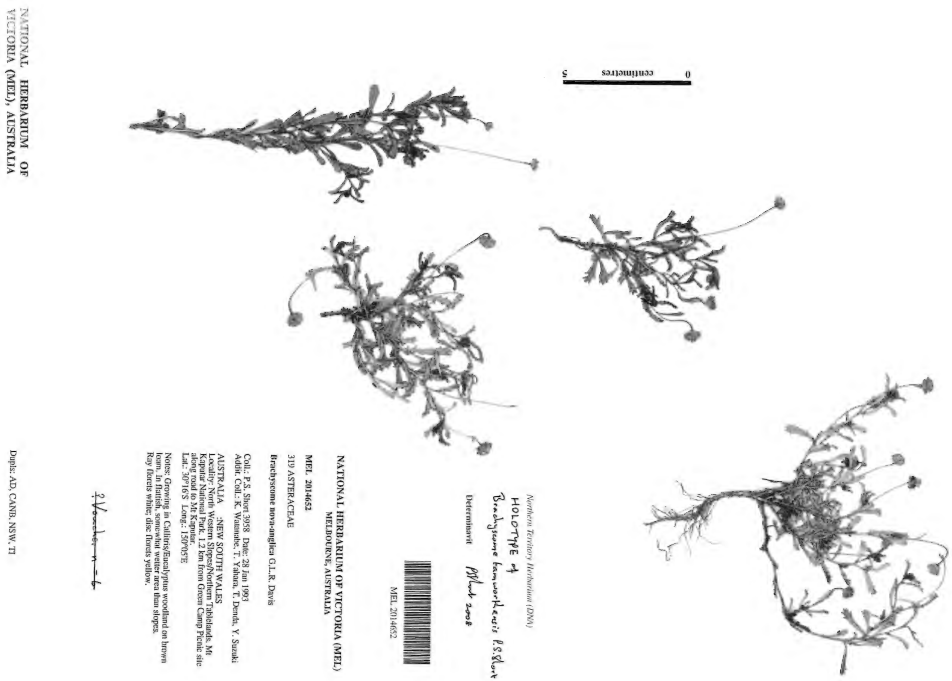
NEW SOUTH WALES: one mile east of Walcha on Emu Creek road, Anon. 3260, 3262A (SYD, single sheet); Moonbie [presumably Moonbi], 23 Nov. 1886, E. Betsche (BRI 331362); Walcha, Oct. 1899, J.F. Campbell (NSW 229910); Attunga State Forest, 27 Sept. 1985, J.R. Hosking (NSW 224187); Attunga State Forest, 17 Nov. 1993, J.R. Hosking 884 (CBG, MEL, NSW, UNE); Nundle, June 1906, J.H. Maiden & J.L. Boorman (NSW 15320); Moonbie, 23 Nov. 1886, Ch. Moore ?70 (MEL 116025); upper Moore Creek, 11 km N of Tamworth, ridge behind Grannys Armchair, 14 May 1983, P. Ollerenshaw 1699 (CBG); Mt Kaputar N.P., 8 km E of information centre, 25 Sept. 1992, K. Watanabe 9 (MEL, NSW, TI).

**62. *Brachyscome trisecta* P.S.Short, sp. nov.**

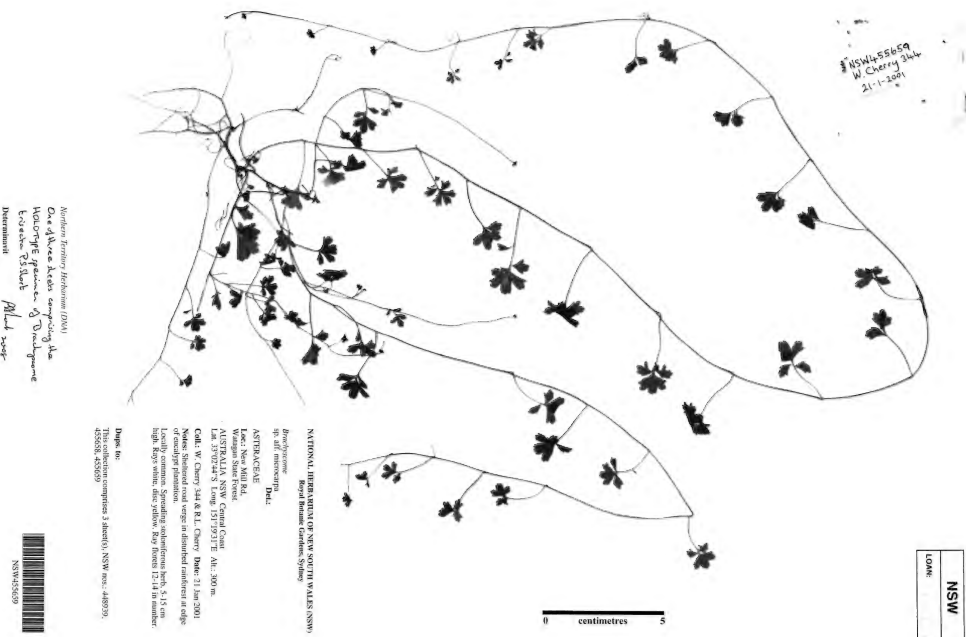
**Type:** New South Wales. Central Coast, Watagan State Forest, 33°02'44"S, 151°19'31"E, sheltered road verge in disturbed rainforest edge of eucalypt plantation, locally common, 21 Jan. 2001, W. Cherry 344 & R.L. Cherry (**holotype**: NSW 448939, NSW 455658, NSW 455659; linked sheets, see under ‘Typification’).

Perennial herb, stoloniferous, almost prostrate, to spreading and weakly erect, 5–15 cm high, longest branches to c. 60 cm long, essentially glabrous, only occasionally with several very small, stalked glandular hairs on leaves. *Leaves* basal and cauline, initial basal leaves apparently lost at maturity, alternate, mainly of 3 (rarely 5) primary lobes which terminate petiole-like stalks which are c. 5–30 mm long with very slightly dilated bases; primary lobes 2.5–12 mm long, 1.5–16 mm wide, divisions extending to about the midrib, terminal lobe manifestly larger than lateral lobes; terminal primary lobes split into 3 smaller lobes formed from divisions extending usually no more than about  $\frac{1}{3}$  of the breadth of the primary lobe, secondary lobes apically 3-toothed; lateral primary lobes with (0) 3 (4) teeth or small lobes; all lobes and teeth with softly mucronate apices. *Involucre* c. 2.5 mm diam. *Bracts* c. 12–18, in about 1 row, somewhat ovate to narrowly ovate, lanceolate or oblanceolate, c. 1.1–1.4 mm long, 0.25–0.6 mm wide, mostly herbaceous, apices and margins hyaline, glabrous. *Receptacle* probably subconical, glabrous. *Ray florets* (8) 12–14, in 1 row. *Ray corolla* 4.7–5.3 mm long, 0.5–0.7 mm wide, white, glabrous; veins 3 or 4, apex not or perhaps minutely lobed. *Disc florets* c. 15, corolla c. 1–1.2 mm long, yellow; lobes 5, externally lacking

**Fig. 44.** Holotype of *Brachyscome tamworthensis* (MEL), P.S. Short 3958.



**Fig. 45.** Part of the holotype of *Brachyscome trisecta* (NSW), W. Cherry 344 & R.L. Cherry.





erect apical hairs. *Stamens* 5; anthers c. 0.53–0.83 mm long; microsporangium c. 0.41–0.64 mm long; apical appendage 0.13–0.19 mm long; endothelial tissue with radial thickening; filament collar straight in outline, basally not thicker than filament, 0.09–0.14 mm long. *Style arms* c. 0.4–0.7 long; apical appendages triangular in outline, c. 0.3–0.5 mm long, stigmatic surface c. 0.1–0.2 mm long. *Cypselas* obovate in outline, 1.3–1.7 mm long, 0.65–0.9 mm wide, immature fruit greenish-yellow, maturing dark brown; lateral surfaces lacking longitudinal ridges, appearing slightly swollen due to c. 20–30, often coalescing, tubercles on each surface; eglandular hairs few, c. 0.01 mm long, straight or curving, not apically bifid or curled; carpodium narrow, annular. *Pappus* a minute crown of erect teeth c. 0.1 mm long, whitish, and basally barely united in a ring. *Chromosome number*: unknown. **Fig. 5E, 45.**

*Distribution.* Known from just two collections from a small region in central, near-coastal, New South Wales, one populations found south of Bulga, the other – the type – in the Watagan State Forest west of Cooranbong.

*Habitat.* The type specimen was collected on a “sheltered road verge in disturbed rainforest at [the] edge of [a] eucalypt plantation”; the only other collection was recorded as growing on moist soil with *Acacia filicifolia*, *A. irrorata*, *Aneilema biflorum*, *Calotis dentex*, *Prostanthera incana*, *Xerochrysium bracteatum* and species of *Geranium* and *Polygonum*.

*Phenology and reproductive biology.* Flowering and fruiting is only recorded for January and February.

Capitula are small, with ray corollas only c. 5 mm long, anthers are less than one millimetre long and a single disc floret from Coveny’s specimen (NSW 127186) produced 2,466 well-swollen and therefore apparently fertile pollen grains. With eight ray and 14 disc florets this computed to a pollen:ovule ratio of 1,569 for the capitulum sampled, a somewhat lower value than normally found in most species of *Brachyscome* s.lat. It may reflect the lack of sampling but perhaps expenditure on the production of larger flowers and more pollen is simply unnecessary in this species, a ready ability to root at nodes being evident from specimens.

*Typification.* As it is stated on accompanying labels that *W. Cherry 344* “comprises 3 sheet[s], NSW 448939, 455658, 455659” all three are considered to constitute the holotype specimen of the name *B. trisecta*, this being a similar situation to that cited in Art. 8.3, Ex. 4 of the *Code*.

*Etymology.* The epithet is in reference to the common number of primary divisions of a leaf, divisions which extend to or about the midrib. It is also appropriate as the terminal lobe is cut into three – although usually no more than to about two-thirds the breadth of the lobe – and in turn is often apically 3-toothed, i.e. there are 3 levels of subdivision.

*Notes.* The combination of a creeping habit, mostly 3-lobed leaves, smallish capitula and ray florets and anthers less than 1 mm long allows for ready distinction from other perennial species with similar cypselas.

Numbers and features of floral and bract characteristics are based on very little material.

*Additional specimen examined.*

NEW SOUTH WALES: western side of Terry’s Creek bridge, 9 miles S of Bulga on the Windsor–Singleton road (Putty Rd), 32°44’S, 150°57’E, 11 Feb. 1968, R.G. Coveny (NSW 127186, 455649 & 455650, linked sheets).

### *Brachyscome nivalis* group

*Brachyscome nivalis* group: P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 850 (1999).

Scapiform perennials, stoloniferous. *Leaves* mostly basal, entire or lobed. *Involucral bracts* in 1 or barely 2 rows, monomorphic, epidermal cells often manifestly thickened (when viewed under magnification; but not in *B. radicans*). *Rays* white or mauve. *Terminal anther appendages* present. *Cypselas* monomorphic, laterally compressed, lateral surfaces with longitudinal ridges demarcating wings from the fruit body, eglandular biseriate hairs either absent, short, curved, or apically slightly inrolled (*B. radicans* only); pericarp with an almost continual layer of sclerenchyma in *B. nivalis*, discontinuous (*B. radicans* and *B. tadgellii*), and restricted to the ab/adaxial margins in *B. stolonifera*. *Chromosome numbers*:  $n = 11, 13, 14, 15$ .

*Distribution.* South-eastern Australia, mainly alpine.

*Notes.* Bracts of all species except *B. radicans* display thickened cell walls and a tendency to have a less well-developed vascular system than found in other species. Sample-size was small and whether or not this is a genetically determined characteristic or one induced by the alpine habitat has not been investigated.

### 63. *Brachyscome barkerae* P.S.Short, sp. nov.

**Type:** Victoria. Snowy Range, Howitt Plain,  $\pm 2\frac{1}{2}$  miles SSE of Mt Howitt, [c. 37°11’S, 146°38’E], 1 Jan. 1973, A.C. Beauglehole 40875 (**holotype**: MEL 529577).

*Brachyscome* sp. 1: P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 851 (1999).

*Brachyscome* sp. aff. *tadgellii* Tovey & P.Morris: M.Gray in Costin et al., Kosciuszko Alpine Fl. 2nd ed. 330 (2000).

[*Brachyscome nivalis* var. *alpina* auct. non (Benth.) G.L.R. Davis: M.Gray in Costin et al., Kosciuszko Alpine Fl. 1st ed. 361, Fig. 299 (1979) (“*Brachycome*”).]

[*Brachyscome tadgellii* auct. non Tovey & P.Morris: J.Everett in G.J.Harden, Fl. New South Wales 3: 162 (1992) (“*Brachycome*”); E.Salkin et al., Austral. Brachyscomes 226 (1995), p.p., the description also covering *B. tadgellii* s.str.]

Stoloniferous, clumping, perennial herb. *Leaves* mainly in basal clusters, mostly or always entire, somewhat linear, 10–45 mm long, 1.8–3.5 mm wide, some leaves with 1–6 short lateral lobes, lobes entire, all leaves mostly glabrous, scattered stalked glandular hairs may

occur on at least upper-most leaves, some inconspicuous cottony eglandular hairs may be present on inner surface of leaf bases, leaves basally dilated, with scarious margins. *Peduncles* 1 per tuft, 5–20 cm long, beset with stalked glandular hairs most dense immediately below the capitulum, each peduncle with 2–16 linear, entire leaves. *Involucre* 10–17 mm diam. *Bracts* c. 20–30, in 1 or more or less 2 rows, of c. equal length, narrowly elliptic or oblanceolate, 5.5–9 mm long, 1.1–2 mm wide, thin, mainly green, with narrow scarious margins and apex, apically acute to obtuse, purplish, glabrous except for minute terminal glands on margins, sometimes a few stalked glandular hairs basally. *Receptacle* subconical, alveolate to fimbriate, glabrous. *Ray corolla* c. 12–15 mm long, white, with 6 or 7 veins, if 7 then 1 joining with the others and not reaching apex, apex not or barely 2-lobed. *Disc florets* with corolla 5-lobed, tube c. 2.6–2.9 mm long. *Stamens* 5; anthers c. 1.2–1.3 mm long; microsporangium c. 0.95–1 mm long; apical appendage c. 0.3 mm long; endothecial tissue with radial thickening; filament collar straight in outline, basally not or barely thicker than filament, c. 0.16–0.2 mm long. *Styles* c. 3.3–3.5 mm long; arms c. 0.8–0.96 mm long; apical appendages somewhat triangular in outline, c. 0.5–0.6 mm long, stigmatic surface c. 0.3–0.39 mm long. *Cypselas* somewhat flattened, widely obovate, 2.3–2.9 mm long, 1.5–2.5 mm wide, uniformly brown or body darker than wings; lateral surfaces each with 2 longitudinal ridges, with a narrow to broad central line of short tubercles running the length of the cypselas, eglandular hairs apparently absent (at least in mature cypselas), glandular hairs may occur on cypselas body; wings 0.5–1 mm wide, edges almost entire to distinctly toothed for some or most of their length, with shortly stalked glandular hairs often present; carpopodium annular, narrow. *Pappus* of white bristles shorter than to exceeding the apical notch, c. 0.4–0.5 mm long. **Fig. 6A, 46.**

**Distribution.** An alpine taxon known from the Snowy Mountains of N.S.W. and from Howitt Plains and Mt Bogong in Victoria.

**Habitat.** Gray (2000) recorded that in the Kosciuszko region the species grows in both short and tall alpine herbfields and also in wet depressions in sod tussock grassland.

**Phenology and reproductive biology.** Flowering and fruiting specimens have been collected from December to March. A pollen:ovule ratio of 2,623 was determined for a single capitulum from *P.S. Short 3998*; it contained 46 ray and 137 disc florets.

**Cytology.** No determination has been made for this species. Gray (2000, p. 330) cited Smith-White et al. (1970, as *Brachyscome nivalis* var. *alpina*) as having recorded  $n = 9 + 2Bs$  but Stace (1981) noted that this determination applies to *B. aculeata*.

**Etymology.** We've talked and corresponded intermittently about daisies for some years and it is with pleasure that I name this species after Mrs Judy Barker, editor of *Australian brachyscomes* (Salkin et al. 1995), a co-author of *Australian Daisies for Gardens and Floral Art* and *Everlasting Daisies of Australia*, and at various stages a leader of the Australian Daisy Study Group (a specialist group – currently on hold – within the Australian Native Plants Society) and editor of its newsletter.

**Notes.** *Brachyscome barkeriae* is perhaps most likely to be confused with *B. tadgellii*. It differs from that species in having a glandular indumentum on the peduncle, more leafy peduncles, mostly entire leaves, and an apparent absence of eglandular hairs on mature cypselas.

#### *Selected specimens examined.*

NEW SOUTH WALES: Lake Albina, 16 Mar. 1947, *A.B. Costin* (MEL 115920); Kosciuszko N.P., Range above Guthega Village Dam, 24 Jan. 1981, *J.M. Powell 1525* (MEL, NSW); Kosciuszko N.P., between Blue Lake and Charlotte Pass, 5 Feb. 1993, *P.S. Short 3998* (MEL, TI); Snowy Mtns, Mt Northcote–Lake Albiba, 11 Mar. 1974, *I.R. Telford 3701* (CBG).

VICTORIA: Mt Bogong, Dec. 1921, *A.J. Tadgell* (MEL 1527498, 115916–115918).

#### **64. *Brachyscome nivalis* F.Mueller.**

Defin. Austral. Pl. 10 (July 1855) ("*Brachyscome*"), preprint from Trans. Philos. Soc. Victoria 1: 43 (Sept. 1855), reprinted in Hooker's J. Bot. & Kew Gard. Misc. 8: 147 (1856), for publication dates see Seberg (1986); Benth., Fl. Austral. 3: 517 (5 Jan. 1867) ("*Brachyscome*"); J.H. Willis, Handb. Pl. Victoria 2: 666 (1973) ("*Brachyscome*"); J. Everett in G.J. Harden, Fl. New South Wales 3: 163 (1992) ("*Brachyscome*"), p.p., excluding specimens referable to *B. barkeriae*; E. Salkin et al., Austral. Brachyscomes 160 (1995); P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 851, Fig. 172d (1999); M. Gray in Costin et al., Kosciuszko Alpine Fl. 1st ed. 232, Fig. 297, 298 (1979) ("*Brachyscome*"), 2nd ed. 187, 330 (2000) (as Kosciuszko). — *Brachyscome nivalis* var. *nivalis*: G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 196, Fig. 56, 67, pl. vi, map 21 (1948) ("*Brachyscome*"), p.p., excluding specimens referable to *B. barkeriae*. — **Type citation:** "On the highest summits of the Australian Alps, in grassy or peaty soil; for instance, on Mount Buller and the Cobboras mountains." **Lectotype:** Alpine summits of the Cobboras Mountains, *F. Mueller* (MEL 220766). (Davis 1948, p. 196). **Isolectotypes:** Cobboras mountains, 6000', *F. Mueller* (K 000882303, MEL 220764, MEL 220765 – ex herb. Sonder); on the Summit of the Cobboras Mountains, 6000', *F. Mueller* (MEL 2034897). **Remaining syntypes:** Mount Buller, *F. Mueller* (K 000882302), Mount Buller, 22 March 1853, *F. Mueller* (MEL 220763); Mount Buller, March 1853, *F. Mueller* (MEL 220762); Mount Wellington, Nov. 1854, *F. Mueller* (MEL 220744 pp.); Munyang Mountains, Jan. 1855, *F. Mueller* (MEL 220744 pp.).

Perennial herb, stoloniferous, clumping. *Leaves* mainly in basal clusters, 1 or 2 pinnatisect, rarely some leaves at least in part 3-pinnatisect, largest 1-pinnatisect leaves with more than 7 lateral lobes, 2- and 3-pinnatisect

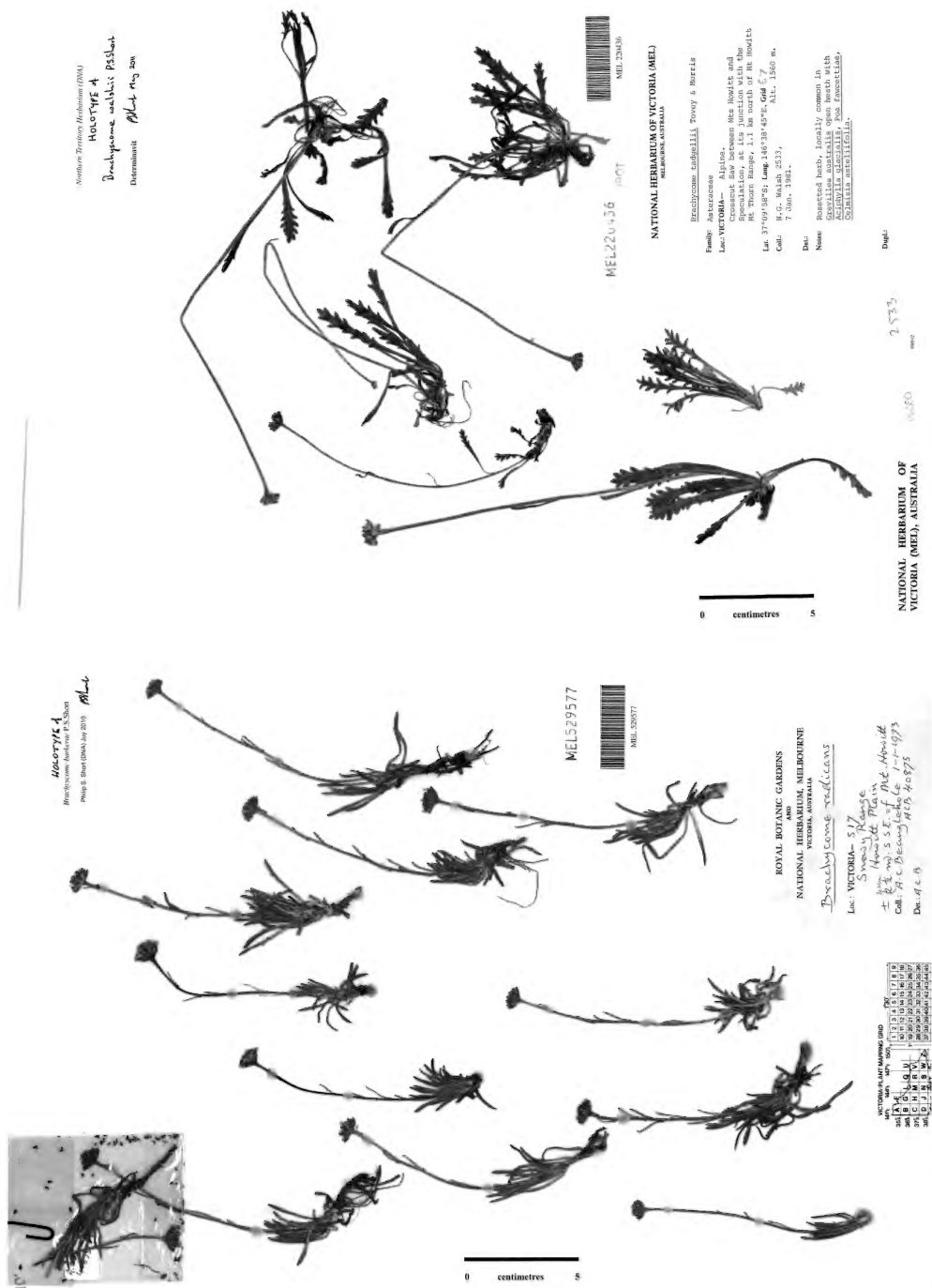




Fig. 48. *Brachyscome nivalis*, Mt Bogong Plateau, Vic. — P.S. Short 3082 et al.

leaves with up to c. 90 ultimate lobes, all pinnatisect leaves 3–13.5 cm long, mostly glabrous, some cottony eglandular hairs may be present basally, scattered stalked glandular hairs, if present, inconspicuous, leaves basally dilated, with scarious margins. *Peduncles* 1 per tuft of leaves, glabrous, each with 1 or more linear, entire leaves. *Involute* 15–20 mm diam. *Bracts* 15–40, in 1 or about 2 rows and of c. equal length, narrowly elliptic, narrowly oblong, oblanceolate or lanceolate, 7–10 mm long, 1–2.5 mm wide, thin, mainly green, with narrow scarious margins and apex, apically obtuse and purplish, glabrous except for minute terminal glands on margins. *Receptacle* subconical, areolate, glabrous. *Ray florets* c. 30–40; corolla 10–17.5 mm long, white, may be pinkish in bud, usually with 4 veins, apically obtuse, minutely 2-lobed. *Disc florets* c. 70–140; corolla 5-lobed, tube 2.5–3.4 mm long. *Stamens* 5; anthers c. 1.35–1.65 mm long; microsporangium c. 0.9–1.4 mm long; apical appendage c. 0.4–0.7 mm long; endothelial tissue with radial thickening; filament collar straight in outline, basally not or barely thicker than filament, c. 0.27–0.35 mm long. *Styles* c. 3–3.6 mm long; arms c. 1.2–1.4 mm long; apical appendages somewhat narrowly triangular in outline, c. 0.55–0.9 mm long, slighter shorter to longer than stigmatic lines which are c. 0.5–0.63 mm long. *Cypselas* somewhat flattened, widely obovate to obovate, 2.3–3.6 mm long, 1.4–2.5 mm wide, uniformly brown or body darker than wings; lateral surfaces each with 2 longitudinal ridges, with a more or less central line of tubercles, somewhat straight to curved eglandular hairs and glandular hairs running the length of the cypselas; wing extending from lateral ridges, edges entire or barely notched, with curved eglandular hairs and minute glandular hairs; carpodium a broad ring; pericarp with sclerenchyma immediately surrounding the vascular bundles and extending under the lateral ridges and then thinning before continuing along the lateral surfaces; vascular bundles in pericarp 2; testa

with thin-walled cells (*R. Melville* 2603). *Pappus* of white bristles c. 0.4–0.7 mm long, c. the length of or exceeding the apical notch. *Chromosome number*:  $n = 11$ . Fig. 6B, 11E, 48.

*Distribution*. Alpine areas of Victoria (e.g. Mts Buller, Hotham and Wellington), New South Wales and A.C.T.

*Habitat*. *Eucalyptus pauciflora* woodland, alpine grasslands commonly dominated by species of *Austrodanthonia* and *Poa*, and alpine herbfields. Often found in crevices in basalt outcrops.

*Phenology and reproductive biology*. Flowering has been recorded from November to May. A pollen:ovule ratio of 2,543 was determined for a large, single capitulum from P.S. Short 4005; it contained 42 ray and 144 disc florets.

Salkin et al. (1995) recorded good seed germination in 8–40 days.

*Cytology*. Determinations of a haploid chromosome number of  $n = 11$  and  $2n = 22$  have been recorded from the Kosciuszko National Park, i.e. from Charlottes Pass (Smith-White et al. 1970, as *B. nivalis* var. *nivalis*) and Club Lake (Watanabe et al. 1996b). Idiograms of somatic metaphase chromosomes have been published by Watanabe et al. (1996a, Fig. 37) and Watanabe et al. (1999, Fig. 84), the latter paper also including a photomicrograph (Fig. 5) of mitotic chromosomes.

*Typification*. The labels accompanying the lectotype and a presumed lectotype specimen (MEL 2034897) referred to above indicate that they were once used, or processed to be used, as part of an educational set and do not carry original collectors' labels. However, there is no reason to believe that the specimens are not part of Mueller's syntype material.

A sheet at K contains isolectotype material of *B. nivalis* but the labelling suggests that there may be more than one gathering represented on the sheet. The sheet contains three elements, each consisting of leaves and one or more peduncles. The largest element is on the left hand side of the sheet and written next to it, and directly on to the sheet, are the words "Victoria, Mueller". Two smaller pieces of plant are attached immediately to the right of this element and the aforementioned label may well apply to at least the middle element (piece). Below the two smaller pieces there is an attached label with the name of the species, a manuscript varietal name, and the information consistent with that on the lectotype, i.e. "Cobboras mountains, 6000' Dr Ferd. Mueller". The label is in Mueller's hand. At the top of the sheet there is a small, unlabelled envelope containing mature fruit.

The remaining syntype material from the Munyang Mountains and Mount Wellington is mounted on the same sheet (MEL 220744) and labels are not clearly attributed to any one specimen.

Dates of publication are based on Seberg (1986).

**Notes.** There is considerable variation in this species in regard to leaf division. Looked at in isolation some specimens may appear to have only 1-pinnatisect leaves or only 2- or 3-pinnatisect leaves but specimens such as *R. Melville* 2603 (at least the NSW sheet) and *P.S. Short* 3034 clearly show that 1-pinnatisect and 2- or 3-pinnatisect leaves occur on the same plants.

*Selected specimens examined.*

NEW SOUTH WALES: Mt Jagungal, 14 Mar. 1970, *J. Pickard & R. Coveny* 2804 (MEL, NSW); Mt Kosciuszko N.P., c. 100 m above Club Lake, 5 Feb. 1993, *P.S. Short* 4005 et al. (AD, CANB, CHR, MEL, NSW, TI).

AUSTRALIAN CAPITAL TERRITORY: Summit area of Mt Gingera, 10 Jan. 1961, *R. Schodde* 1250 (CANB, MEL, NSW).

VICTORIA: Falls Creek area, 1 Jan. 1964, *B.G. Dangerfield* 5 (AD, MEL); Mt Bogong Plateau, 18 Jan. 1988, *P.S. Short* 3082 et al. (MEL).

### 65. *Brachyscome radicans* Steetz

in Lehm., Pl. Preiss. 1: 429 (14–16 Aug. 1845) (“*Brachycome*”); Hook.f., Fl. Tasman. 1: 184 (1856) (“*Brachycome*”); Benth., Fl. Austral. 3: 512 (1867) (“*Brachycome*”); G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 167, Fig. 20, 30, pl. vi, map 9 (1948) (“*Brachycome*”); W.M. Curtis, Stud. Fl. Tasman. 295 (1963) (“*Brachycome*”); J.H. Willis, Handb. Pl. Victoria 2: 669 (1973) (“*Brachycome*”); J. Everett in G.J. Harden, Fl. New South Wales 3: 164 (1992) (“*Brachycome*”); E. Salkin et al., Austral. Brachyscomes 194 (1995); P.S. Short in N.G. Walsh & Entwistle, Fl. Victoria 4: 853, Fig. 172e (1999). — **Type citation:** “In region. interior. Australiae meridional. occid. Herb. Preiss. sine No. In insula van Diemen leg. cl. Gunn. Herb. Gunnian. No. 513. Vidi siccatum in herbario amicissimi cl. Zuccarinii.” **Lectotype:** Tasmania, *R. Gunn* 513 (MEL 220563 p.p., ex herb. Steetz). (Davis 1948, p. 167, Fig. 20). **Isolectotypes or possible isolectotypes:** Van Diemen’s Land, *R. Gunn* 513 (K 000882195, printed label with “Sir W.J. Hooker, 1838”); Van D<sup>s</sup> L., *Mr Gunn* 513 (K 000882196); V.D.L.<sup>d</sup>, *R. Gunn* 513 (K 000882194); Marlborough, 4 Jan. 1841, *R. Gunn* 513/1842 (K 000882198); Arthurs Lakes, 18 Feb. 1843, *R. Gunn* 513/1842 (NSW 15208); *R. Gunn* 513 (W). **Syntype:** “*Achaenia matura* ...” (MEL 220563 p.p., ex herb. Steetz, see below).

[*Brachyscome nivalis* var. *alpina* auct. non (F. Muell. ex Benth.) G.L.R. Davis; W.M. Curtis, Stud. Fl. Tasman. 297 (1963) (“*Brachycome*”).]

Stoloniferous, somewhat tufted or creeping perennial herb, longest branches c. 35 cm long but tufted plants often only c. 10 cm tall. *Leaves* in near basal clusters or spreading along an elongate stem, linear, entire, or with 2–8 oblong or linear lobes, entire leaves 2–13 cm long, 0.5–3.5 mm wide, all leaves glabrous, dilated basally, bases with slightly scarious margins. *Peduncles* 1 per tuft, 8–16 cm long, with 1 or 2 linear leaves usually in lower half, glabrous. *Involucre* 7–11 mm diam. *Bracts* 9–17, more or less in a single row and of equal length, obovate, 3.7–4.5 mm long, 1.6–2.5 mm wide, thin, body green, with an obvious vascular system, with broad scarious margins and apex, apically obtuse and purplish, glabrous except for minute glands marginally. *Receptacle* subconical, areolate to alveolate, glabrous.

*Ray florets* 14–43, corolla 7–14 mm long, white, or white above and pale mauve below, or entirely bluish or pinkish. *Disc florets* c. 15–70, corolla 5-lobed. *Stamens* 5; anthers c. 0.9 mm long. *Style* branches c. 0.7 mm long, appendages triangular, longer than stigmatic part. *Cypselas* somewhat flattened, obovate, 1.4–2.3 mm long, 0.95–1.35 mm wide, uniformly yellow-brown, brown, grey brown or dark purple-brown, sometimes discoloured with body darker than margins; lateral surfaces each with 2 longitudinal ridges; central face smooth or with a tuberculate ridge running the length of the cypselas, tubercles of the ridge with curved to slightly inrolled eglandular hairs; ab/adaxial margins extending from lateral ridges swollen, entire, smooth or with small tubercles on edges, with eglandular hairs which are straight to curved or have slightly inrolled apices; pericarp with 2 vascular bundles, with transverse sections showing a multi-celled layer of sclerenchyma extending around much of the fruit body but absent near longitudinal ridges; testa with thin-walled cells (*E. Gauba*, CBG 12111); carpodium seemingly absent, or a very narrow ring of cells. *Pappus* of bristles c. 0.3–0.4 mm long. *Chromosome number:*  $n = 13$ . **Fig. 6C, D.**

**Distribution.** Occurs in Tasmania and on the Australian mainland, from north-eastern New South Wales south to far eastern Victoria. (e.g. Nunniong Plateau).

**Habitat.** A species of permanently or near permanently wet situations, such as stream banks, the margins of lakes and lagoons and shallow swamps.

**Phenology and reproductive biology.** Flowering has been recorded as early as September and as late as April but collection data indicate that flowering mainly occurs from late December to mid-March.

A pollen:ovule ratio of 2,802 was determined for a capitulum of *P.S. Short* 3976; it had 43 ray and 69 disc florets.

Salkin et al. (1995) recorded good germination of seed in 10–60 days.

**Cytology.** The chromosome determination of  $n = 13$ ,  $2n = 26$  has been determined from populations in N.S.W., i.e. from the vicinity of Guyra and Rules Point (Smith-White et al. 1970; Watanabe et al. 1996b). Idiograms of somatic metaphase chromosomes have been published by Watanabe et al. (1996a, Fig. 38) and Watanabe et al. (1999, Fig. 86).

**Typification.** I have not seen, and nor did Davis (1948), an unnumbered Preiss specimen from south-western Australia annotated as *B. radicans* by Steetz. Davis subsequently recorded “Tasmania, 1844, Gunn, n. 513 (lectotype MEL; lectoparatype NSW)”, further noting that the specimen selected as the lectotype is part of Steetz’s own herbarium, that “the sheet to which it is affixed bears the inscription ‘*Brachyscome radicans nobis*’ in Steetz’s handwriting” and that there can be no doubt that it is an authentic syntype specimen. I concur with this, having noted elsewhere (e.g. Short &

Sinkora 1988) that for species described by Steetz in Lehmann's *Plantae Preissianae* it is specimens in his own herbarium, not Lehmann's in LD, which should generally be chosen as lectotype specimens.

Davis did not annotate the MEL sheet (MEL 220563) containing the lectotype specimen, an annotation "Syntype" being in the hand of J.H. Willis. However, the lectotype specimen is clearly annotated, in part, as "Gunn 513". It consists of a single plant with an immature capitulum plus florets which are in an accompanying envelope, the two components being linked as indicated by an annotation by Willis on the envelope which reads "Florets from specimen below, Herbar. Gunn. No. 513".

The lectotype sheet contains other specimens of *B. radicans*. To the right of the lectotype specimen there is a single non-fruiting plant labelled "In insula van Dieman lectam, ex Anglia attulit Leibold, emi 1844 s.n. 'Chrysanthemi sp.'" It has no type status. There are also two other envelopes containing plant material. One contains several florets. It is only annotated with the initial "B", indicating that it was seen by Bentham, but they appear to have been removed from the Leibold specimen. The other envelope is annotated by Steetz "Achaenia matura Brachycomes radicaulis [sic] nobis" and contains six mature fruit. They cannot be associated with either the lectotype or Leibold's specimen, both of them only having an immature capitulum. However, from the description it is evident that Steetz saw mature fruit and thus the envelope's contents must constitute a syntype specimen.

Steetz's full annotation below the lectotype specimen is "In insula van Diemen leg. Cl. Gunn (Herbar. Gunn. N. 513) misit cl. Hooker, ded amicus cl. Zuccarini, 1844". From this, and the protologue, it is evident that further material of *R. Gunn 513* could be in Zuccarini's herbarium, now housed in M, but I have not attempted to verify this. As also suggested by the reference to Hooker in Steetz's annotation, there are also specimens in K. Indeed, K has five sheets of *R. Gunn 513*. The material is representative of more than one gathering as indicated by different localities and dates. This is typical of Gunn's specimens, with Gunn using species numbers rather than specimen numbers. Given that the lectotype specimen was received by Steetz in 1844 one of the K specimens (K 000882200) collected from Arthurs Lakes on 17 Jan. 1845 can be discounted as being a possible type. However, the four other sheets, each listed above, that contain material of *R. Gunn 513* must be considered to have, or possibly have, type status. Reference to the year 1842 indicates that the specimens were part of a larger collection dispatched to Kew, with Gunn appending this general collection date to all specimens, irrespective of the year they were actually gathered, for sake of reference (e.g. Short 1986).

Should extant material of *R. Gunn 513* exist in M it may be possible to more accurately determine which K specimens are isocotypes.

The JSTOR website, when viewed in August 2012, displayed a supposed type specimen (NY 00162722) of *B. radicans*. The handwritten label indicates that the collector was Joseph Milligan, with the specimen collected from margins of Macquarie Harbour, Tasmania. However, it has no type status, having been collected in 1847, after publication of the name.

**Notes.** There is considerable variation across the geographical range of this species, particularly in regard to fruit characteristics and habit. Limited observations suggest that in regard to habit the tufted form is from exposed sites while plants with elongate, somewhat scrambling stems are found in areas where they are shaded by other vegetation. Cypselas vary considerably in colour and, most noticeably, in the absence or presence and distribution of tubercles.

Many specimens lack fruit but from those that do have mature cypselas it appears that populations from north-eastern New South Wales and much of the south-east of that State have fruit which lack tubercles on the lateral surfaces whereas those in Victoria plus some from south-eastern New South Wales usually have a line of tubercles on each of the lateral surfaces. Tasmanian populations mostly have tubercles on both surfaces, although at least one collection (*A. Moscal 15347*), which appears to be of this species, but with immature fruit, lacks tubercles. At least two other collections (*N.T. Burbidge 3404* and *P.C. Jobson 1908*) from Tasmania usually have fruit with tubercles on both surfaces but some are tuberculate on one surface only.

One of the aforementioned collections, *N.T. Burbidge 3404*, plus another from near Kiandra in the Snowy Mountains (*E. Gauba*, CBG 012110) have several aberrant fruit which are 3-angled, with 2 lateral ridges on each surface.

#### *Selected specimens examined.*

NEW SOUTH WALES: Kiandra Plain, Kosciuszko NP, 24 Feb. 1987, *A. Slee & D. Wimbush 2144* (CANB); Mother of Ducks Nature Reserve, 31 Jan. 1993, *P.S. Short 3976* (AD, CANB, HO, MEL, TI).

AUSTRALIAN CAPITAL TERRITORY: Naas Creek, near Old Boboyan Homestead, 25 Jan. 1961, *M. Gray 4977* (CANB).

VICTORIA: Nunniong Plain, 26 Feb. 1982, *N.G. Walsh 836* (MEL).

TASMANIA: Interlaken road, 10 miles from Bothwell, 22 Dec. 1958, *W.M. Curtis* (HO 52223).

#### **66. *Brachyscome stolonifera* G.L.R.Davis**

Proc. Linn. Soc. New South Wales 74: 145, Fig. 1-3 (1949) ("*Brachycome*"); J. Everett in G.J. Harden, Fl. New South Wales 3: 158 (1992) ("*Brachycome*"); E. Salkin et al., Austral. Brachyscomes 222 (1995) ("*Brachycome*"); M. Gray in Costin et al., Kosciuszko Alpine Fl. 1st ed. 362, Fig. 301 (1979) ("*Brachycome*"), 2nd ed. 188, 331 (2000) (as Kosciuszko). — **Type citation:** "Holotype: Summits of Kosciuszko plateau, N.S.W., ca. 7,000 ft., 1947, A. Costin (MEL). Paratypes: Eleven. loc. cit. (MEL)." **Holotype:** Summits of Kosciuszko Plateau, N.S.W., ca. 7,000 ft., March 1947, *A.B. Costin* MEL 220544 p.p. **Isotypes:** BRI 127379; MEL 220544 p.p., excluding the element marked

in blue ink as the holotype; MEL 220545; MEL 658087; NSW 15569.

[*Brachyscome nivalis* var. *alpina* auct. non (Benth.) G.L.R. Davis: G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 198 (1948) ("*Brachyscome*"), as per excluded syntype from Munyang Mountains. See following treatment of *B. tadgellii*.]

Perennial, stoloniferous, creeping herb. Leaves in basal clusters, narrowly oblong to linear or linear oblanceolate, 10–50 mm long, 1–3 mm wide, entire, apically blunt, glabrous, basally dilated. Peduncles 1 (rarely 2) per tuft, 2–9 cm long, with 0–2 leafy bracts, glabrous. Receptacle hemispherical, glabrous, appearing to be areolate to somewhat fimbriate (with jagged edges). Involucre c. 7 mm diam. Bracts c. 16 or 17, more or less in a single row and of equal length, subelliptic or obovate, 4–6.5 mm long, 1.5–2.2 mm wide, thin, apically obtuse to subacute, centre green, with broad scarious margins, about the upper ½ of the margins purplish and fringed with microscopic glandular-septate hairs, often minutely lacerate. Receptacle alveolate, glabrous. Ray florets c. 15–30; corolla c. 6–10 mm long, 1–1.3 mm wide, commonly white, also recorded as pink or white above and pale mauve below, with 4 or 5 veins. Disc florets 5-lobed, yellow. Stamens 5; anthers c. 0.96–1.05 mm long; microsporangia 0.7–0.78 mm long; apical appendage 0.23–0.32 mm long; filament collar 0.15–0.2 mm long, straight in outline, basally not thicker than filament. Style c. 2–2.3 mm long; style arms 0.5–0.64 mm long, appendages triangular, 0.28–0.4 mm long, slightly longer than stigmatic part which is 0.2–0.3 mm long. Cypselas somewhat laterally flattened, obovate in outline, 1.8–2.1 mm long, 0.9–1.2 mm wide, uniformly brown or reddish-brown except for carpodium; lateral surfaces swollen, longitudinal ridges not or barely developed, surfaces smooth or barely tuberculate, with scattered but conspicuous, biseriate, septate, glandular hairs c. 0.05–0.2 mm long, eglandular hairs apparently absent; ab/adaxial margins thinner than fruit body, with a minute wing-like extension (Buchanan 10805), with scattered glandular hairs as on body, margins smooth or slightly tuberculate; pericarp with 2 vascular bundles, sclerenchyma and collenchyma restricted to ab/adaxial margins; cells of testa with u-shaped thickening (Buchanan 10805); carpodium annular, whitish. Pappus of several-seriate white bristles c. 0.5–1.0 mm long, of somewhat uneven length, basally fused in a ring. Chromosome number:  $n = 15$ .

**Distribution.** Endemic to alpine tracts of the Kosciuszko region, N.S.W.

**Habitat.** Grows in alpine herbfield and sod tussock grassland.

**Phenology and reproductive biology.** Flowering occurs from about early January to March, with fruiting specimens recorded in late March.

Salkin et al. (1995) recorded that seed germinates in 10–40 days.

**Cytology.** A chromosome number of  $n = 15$  was recorded by Smith-White et al. (1970, Fig. 15) and by Watanabe et al. (1996b). Idiograms of somatic metaphase chromosomes have been published by Watanabe et al. (1996a, Fig. 39) and Watanabe et al. (1999, Fig. 89).

**Typification.** From the protologue it is clear that Davis (1949b) only viewed the holotype and the 11 other elements (isotypes) mounted with it on MEL 220544. Duplicate specimens (isotypes) not seen by her are also held at BRI, MEL and NSW.

**Notes.** A comparison of mature fruit and cleared fruit suggests that the occasional ridging seen on the lateral surfaces of the fruit are not poorly-developed, non-vascular longitudinal ridges but merely indicate the position of the line of well-developed vascular tissue in the pericarp. This, plus the absence of well-developed wings, the presence of glandular hairs, and absence of eglandular hairs on the cypselas, plus the possession of entire leaves, are characteristics suggesting that this species is closer to *B. obovata* and other members of the *Paquerina* group than members of the *B. nivalis* group, but the chromosome number of  $n = 15$  is at variance with this suggestion.

I have referred a remaining syntype specimen of *Brachyscome cardiocarpa* var. *alpina* Benth. (= *B. tadgellii*) to this species, this being Mueller's specimen from Munyang Mountains (MEL 115913). The involucre bracts are not minutely fimbriate (as is common) and the pappus bristles are quite long but the hairs of the bracts, together with the location, indicate that it belongs to this species.

#### *Selected specimens examined.*

NEW SOUTH WALES: near Blue Lake, Mt Kosciuszko, 3 Feb. 1988, A.M. Buchanan 10805 (HO); headwater of western tributary to Trapyard Creek (c. 6.5 km E of Mt Kosciuszko), 25 Jan. 1957, H.J. Eichler 13504 (AD); Mt Kosciuszko, 22 Jan. 1952, E. Gauba (CBG 012115); Mt Kosciuszko, Feb. 1893, R. Helms (NSW 225257); Kosciuszko N.P., beside trail to Blue Lake, 10 Feb. 1985, E.H. Norris 108 (NSW); Kosciuszko N.P., halfway between Rawson's Pass and Lake Cootapatamba, c. 36°27'S, 148°15' E, 16 Mar. 1977, D. Verdon 2681 et al. (CBG).

#### 67. *Brachyscome tadgellii* Tovey & P.Morris

Victorian Naturalist 38: 135, Fig. 4 (1922) ("*Brachyscome*"); E. Salkin et al., Austral. Brachyscomes 174 (1995), p.p., excluding specimens with glandular-hairy peduncles, these being *B. barkerae*; P.S. Short in N.G. Walsh & Entwistle, Fl. Victoria 4: 851, Fig. 172c (1999). — **Type citation:** "Mount Hotham, Victoria, 6,000 feet A.J. Tadgell, December, 1913, December, 1921." **Lectotype:** Mt Hotham, Dec. 1913, A.J. Tadgell (MEL 115907 p.p.). (Davis 1948, p. 198). **Isotypes:** (MEL 115907 p.p. & MEL 115910). **Remaining syntypes:** Mt Hotham, December 1921 to Jan. 1922, A.J. Tadgell (MEL 115907 p.p., MEL 115908, MEL 115909).

*Brachyscome cardiocarpa* F.Muell. ex Benth. var. *alpina* Benth., Fl. Austral. 3: 517 (1867) ("*Brachyscome*"). — *Brachyscome nivalis* F.Muell. var. *alpina* (Benth.) G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 198,



Fig. 57, pl. vi, map 21 (1948) ("*Brachycome*"; J.H. Willis, Handb. Pl. Victoria 2: 665, 666 (1973) ("*Brachycome*").

— **Type citation:** "Baw-Baw, Munyong and Cobra Mountains, Victoria, at an elevation of 4000 to 6000 ft., *F. Mueller*." **Lectotype:** In ... caespitosis turfosis in ... montis Cobra, Feb. 1854, *F. Mueller* (MEL 115912). (Davis 1948, p. 198, Fig. 57). **Isolectotypes:** Cobberas Mountains, *F. Mueller* (K 000890218), NSW 15408. **Excluded syntypes:** Munyang [Snowy] Mountains, Jan. 1855, *F. Mueller* (MEL 115913), is of *B. stolonifera* G.L.R. Davis; Mount Baw Baw, 4-5000' (Snowy plains), Dec. 1860–Jan. 1861, *F. Mueller* (MEL 115914), is of *B. obovata* G.L.R. Davis.

Perennial, stoloniferous but clumping perennial herb. Leaves mainly in basal clusters, entire and linear or linear-oblongate, 1.5–7.5 cm long, 2–4 mm wide, or with 1–7 lateral lobes, lobes entire, all leaves glabrous or some inconspicuous cottony eglandular hairs may be present on the adaxial basal surface, leaves basally dilated, with scarious margins. Peduncles 1 per tuft, 7–22 cm long, glabrous, each with 1–7 linear, entire leaves. Involucre 12–20 mm diam. Bracts 20–30, in more or less 1 row and of c. equal length, narrowly elliptic or oblanceolate, 5.5–7.2 mm long, 1.4–2.2 mm wide, thin, mainly green, with narrow scarious margins and apex, apically obtuse and purplish, glabrous except for minute terminal glands marginally. Receptacle subconical, alveolate to fimbriate. Ray florets c. 30–40; corolla c. 10 mm long, white at maturity, at least sometimes pink or red in bud. Disc florets 5-lobed, yellow. Stamens 5; anthers each with a sterile apical appendage. Style branches c. 1 mm long, sterile apical appendages triangular and longer than the stigmatic part. Cypselas monomorphic, laterally compressed, very widely obovate to widely obovate, 1.6–2.6 mm long, 1.4–2.2 mm wide, uniformly brown or body darker than margins; lateral surfaces each with 2 longitudinal ridges and a central line or ridge of curved eglandular hairs and glandular hairs running the length of the fruit, ridge sometimes appearing to be minutely tuberculate, eglandular, glandular hairs may also occur elsewhere on fruit body; wings extending from lateral ridges 0.5–0.7 mm wide, edges entire or almost so, with curved eglandular hairs and stalked glandular hairs; pericarp with sclerenchyma immediately surrounding vascular bundles and extending under lateral ridges, also on central part of the lateral surfaces, apparently not continuous; vascular bundles in pericarp 2; cells of testa with u-shaped thickening (*P.S. Short 3108*); carpodium annular, narrow and indistinct. Pappus of white bristles exceeding apical notch, c. 0.5–0.7 mm long. Chromosome number:  $2n = 28 + 0-2Bs$ .

**Distribution.** Alpine regions of Victoria, with collections from the Dargo High Plains, Mt Hotham, Bogong High Plains and the Cobberas.

**Habitat.** Commonly grows in open grasslands and herbland with poor drainage. Associated species noted by collectors include *Carex hebes*, *Cotula alpina*,

*Hypericum japonicum*, *Poa costiniana* and *Pratia surrepens*.

**Phenology and reproductive biology.** Flowers from c. December to April.

Salkin et al. (1995) included *B. barkerae* within their circumscription of *B. tadgellii*. Their illustration of mature fruit from a Lankeys Plains specimen suggests that their note that freshly collected seed may be sown immediately and that seed germinates very well in 6–40 days refers to *B. tadgellii* s.str.

**Cytology.** Watanabe et al. (1999, Fig. 87) recorded  $2n = 28 + 0-2Bs$  for a population from Lankeys Plain, Dargo High Plains and presented an idiogram of the somatic metaphase chromosomes. I (Short, unpublished) have also recorded  $n = 14$  from a population (*P.S. Short 3108*) from Mt Jim on the Bogong High Plains.

**Typification.** Davis (1948) referred to a lectotype specimen of the name *B. tadgellii* but failed to annotate any syntype material as the lectotype. Undoubtedly, the single plant on MEL 115907 which Davis labelled as the holotype should be regarded as the lectotype specimen to which she referred in her revision.

In regard to the syntypes of *B. cardiocarpa* var. *alpina* the locality "Munyong" is a misspelling in Bentham (1867) of Mueller's name "Munyang Mountains", the name used by Mueller for the Snowy Mountains. Similarly, the spelling "Cobra" is incorrect, and refers to Mt Cobberas. The isolectotype of *B. cardiocarpa* var. *alpina* at K (K 000890218) is filed under the name *Allittia cardiocarpa*, a syntype specimen of that name being mounted on the same sheet.

#### Specimens examined.

VICTORIA: 1.5 km NW of Mt Jim, 22 Jan. 1980, *R.J. Adair* (MEL 647033); c. 1 km NE of Mt Jim trig, 11 Mar. 1984, *D.E. Albrecht* 267 (MEL); Lankeys Plain, Dargo High Plains, 7 Apr. 1992, *D.E. Albrecht* 4942 (MEL); Towonga Huts, Bogong High Plains, 25 Jan. 1967, *A.C. Beaglehole* 22474 (MEL); Cobberas No. 1, *A.C. Beaglehole* 36485 & *E.W. Finck* (MEL); Bogong High Plains, creek draining Little Round Plain to the western tributary of Kiewa River, 3 Dec. 1986, *E.A. Chesterfield* 1847 (MEL); Pretty Valley, Bogong High Plains, 25 Jan. 1970, *L.A. Craven* (CANB 251607); Pretty Valley, Bogong High Plains, 25 Jan. 1970, *C.L. Gunn* (CANB 251607); Mt Cobberas No. 1, 17 Jan. 1970, *K.C. Rogers* (MEL 600460); headwaters of High Plains Creek on eastern slope of Mt Jim, 20 Jan. 1988, *P.S. Short 3108* et al. (MEL); Mt Hotham, Dec. 1918, *A.J. Tadgell* (MEL 1527497); Mt Hotham, Sept. 1921, *A.J. Tadgell* (NSW15410); Lankeys Plain, 31 Dec. 1981, *N.G. Walsh* 734 (MEL); Cobberas, *N.A. Wakefield* 2485 (MEL 1508450); Cobberas, 12 Jan. 1949, *N.A. Wakefield* 2688 (MEL); head of Bundarra River, near Mt Jim, 15 Jan. 1946, *J.H. Willis* (MEL 115922); in swampy ground in depressions between Cobberas summit & Asses Ears, 22 Feb. 1974, *J.H. Willis* (MEL 612515).

#### 68. *Brachyscome walshii* P.S. Short, sp. nov.

**Type:** Victoria. Crosscut Saw between Mts Howitt and Speculation, at its junction with the Mt Thorn Range, 1.1 km north of Mt Howitt (37°09'58"S, 146°38'45"E), rosetted herb, locally common in *Grevillea australis*

open heath with *Aciphylla glacialis*, *Poa fawcettiae*, *Celmisia asteliifolia*, 7 Jan. 1981, N.G. Walsh 2533 (holotype: MEL 220436).

*Brachyscome* sp. 2: P.S.Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 853 (1999).

Perennial, stoloniferous, clumping, perennial herb. Leaves mainly in basal clusters, 1.5–6.5 cm long, 5–9 mm wide, pinnatilobed, with 5–11 lateral lobes; lobes entire, leaf surfaces with sparse to somewhat dense (in young leaves) indumentum mostly of stalked glandular hairs, scattered eglandular, long, septate hairs may also be present; basally leaves dilated, with scarious margins. Peduncles 1 per tuft, c. 15–20 cm long, beset with shortly stalked glandular hairs and possibly some scattered, long, septate eglandular hairs, each peduncle with 1 or 2 linear, entire leaves. Involucre 9–15 mm diam. Bracts c. 15–20, in more or less 1 row, of c. equal length, narrowly elliptic, 6.5–7 mm long, 1.5–1.8 mm wide, thinly herbaceous, with broad scarious margins and apices, scarious parts and sometimes entire bract purplish, outer surface glabrous or with stalked glandular hairs. Receptacle convex to subconical, alveolate, glabrous. Ray florets probably white. Disc florets 5-lobed, yellow. Stamens 5; anthers each with a sterile apical appendage. Style branches with sterile apical appendages triangular, longer than stigmatic part. Cypselas monomorphic, somewhat flattened, obovate, 2.3–2.7 mm long, 1–1.5 mm wide, uniformly brown, lateral surfaces each with 2 longitudinal ridges and with a complete or incomplete broad central line of short tubercles running the length of the fruit, straight to slightly curved eglandular hairs and stalked glandular hairs may be present; ab/adaxial margins extending from lateral ridges 0.1–0.2 mm wide, edges almost entire to distinctly toothed for some or most of their length, with shortly stalked glandular hairs and straight to curved eglandular hairs present; pericarp sclerenchyma distribution not observed; vascular bundles in pericarp 2; testa not observed; carpopodium annular, narrow, whitish. Pappus of white bristles in a short corona, c. 0.1–0.3 mm long, extending beyond a barely formed apical notch. **Fig. 6E, 47.**

**Distribution.** Endemic to the high-country of eastern Victoria. Only known from Crosscut Saw (between Mts Howitt and Speculation), Mt Clear and Racecourse Plain.

**Habitat.** Grows in alpine grassland and in open heath, with *Grevillea australis*, *Aciphylla glacialis*, *Poa fawcettiae* and a species of *Celmisia* being recorded associates. Locality data suggests that this species grows on soil derived from sedimentary rock; this is definitely the case for the Crosscut Saw collection.

**Phenology.** All specimens examined have mature capitula with withered ray florets, suggesting that flowering occurs in December and January.

**Cytology.** No data available.

**Etymology.** The specific epithet honours Neville Walsh (MEL) who can list, among his many valuable botanical

accomplishments, the authorship and editing of many treatments of the *Flora of Victoria*.

**Notes.** This species differs from *B. nivalis* in having peduncles with stalked glandular hairs and in the leaves never being 2- or 3-pinnatisect; it differs from *B. barkerae*, *B. stolonifera* and *B. tadgellii* in having pinnatilobed leaves with 5–11 lateral lobes.

Specimens examined have mature capitula and mostly lack ray florets; the several florets in one specimen were probably white when fresh.

**Additional specimens examined.**

VICTORIA: Snowy Range, Racecourse Plain, 2 Dec. 1989, E.A. Chesterfield 2590 (MEL); Mt Clear, 19 Jan. 1973, A.C. Beaglehole 41238 & E.A. Chesterfield (MEL).

### *Paquerina* group

*Brachyscome scapigera* group: P.S.Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 856 (1999).

*Brachyscome tenuiscapa* group: P.S.Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 858 (1999)

Mostly stoloniferous, scapiform perennial herb. Involucral bracts usually in 1 or c. 2 rows of equal length. Terminal anther appendages present. Cypselas monomorphic, laterally compressed, concolorous; lateral surfaces lacking longitudinal ridges and tubercles, often smooth and glabrous but some species with scattered but often prominent hairs; ab/adaxial margins not to noticeably rib-like. Chromosome number: mostly  $x = 9$ .

**Distribution.** Eastern Australia, New Guinea and New Zealand.

**Chromosome numbers.** Chromosome numbers determined are almost invariably  $n = 9$  or presumed to be based on  $x = 9$ , the only exception being a determination of  $2n = 28$  for *B. foliosa*.

**Etymology of the name** *Paquerina*. Cassini gave no reason for the derivation of *Paquerina* but it is apparent that he took it from the French word for daisy, *pâquerette* from which the diminutive feminine ending has been removed and replaced by the feminine Latin adjectival suffix *-ina*, meaning resembles or like. Hence the name means “like a daisy”. That he chose the name presumably reflects the fact that the type species had been originally placed in the genus *Bellis* which contains the common daisy of Europe. Cassini did not use the diacritic sign over the “a” when spelling the name, and he spelt it several times in the original place of publication, so I take it that this was a deliberate action on his part. Had he used the spelling *Pâquerina* then Sonder (1853) would have been correct in altering the spelling to *Pacquerina* as the transcription of the French *â* is ‘ac’. Given the French pronunciation of *pâquerette* the pronunciation of *Paquerina* is perhaps best taken to be Park-e-reena.

**Notes.** This grouping includes all species of *Brachyscome* s.lat. which have terminal appendages on their

anthers, and cypselas which are generally somewhat ovate in outline, are laterally compressed and lack tubercles, longitudinal ridges and ab/adaxial wings. Members may or may not have a pappus.

The generic name *Paquerina* Cass. is available [*Paquerina* Cass. in F.Cuvier, Dict. Sci. Nat. 37: 464, 492 (1825), Type: *Bellis graminea* Labill. = *P. graminea* (Labill.) Cass. ex Less.] for the group, but I very much doubt that this grouping of species is monophyletic and have therefore not formally adopted it. Indeed, morphological features suggests affinities of at least some species in the group are with *Keysseria* Lauterb., *Lagenophora* Cass. and *Myriactis* Less., affinities with *Keysseria* and *Myriactis* also being supported by molecular work (e.g. Brouillet et al. 2009).

Descriptions of all species in eastern Australia are provided below.

For descriptions of the two species (*B. elegans* Koster and *B. papuana* Mattf.) recognised in New Guinea see Koster (1966) and Royen (1983).

For an account of species in New Zealand see, for example, Webb (1988) – who recognised five native species: *B. humilis* G.Simpson & J.S.Thomson, *B. linearis* (Petrie) Druce, *B. longiscapa* G.Simpson & J.S.Thomson, *B. radicata* Hook.f. and *B. sinclairii* Hook.f. – and the New Zealand Plant Conservation Network website in which the additional species, *B. montana* G.Simpson and *B. pinnata* Hook.f. are recognised, as in Appendix 2 of this review. However, as *B. radicata* is also considered to occur in Tasmania a description of it is also given here. I also note here that from transverse sections of a single cypselas of each of *B. linearis* (L.B. Moore, CHR233898), *B. longiscapa* (H. Talbot, CHR 398056), *B. radicata* (A.P. Druce, CHR 190628) and *B. sinclairii* (W.R. Sykes 465/70, CHR) that in all four species the cells of the testa are evenly thickened. Furthermore, in *B. longiscapa*, *B. radicata* and *B. sinclairii* highly-thickened sclerenchymatous tissue appears to be restricted to the ab/adaxial margins. In contrast, the transverse section of the fruit of *B. linearis* displayed a continual layer of collenchyma in the pericarp. Examination of a single specimen, L.B. Moore (CHR 233898), of *B. linearis* also revealed that a single disc floret with 3 anthers produced just 293 pollen grains while the capitulum from which this disc floret was removed contained 14 female ray florets and seven bisexual disc florets. This equates to a pollen:ovule ratio of 98, a figure usually indicative of a high degree of self-pollination and self-compatibility.

During the course of my studies I returned a number of specimens to herbaria with annotations indicating that I was not only reinstating the generic name *Paquerina* and the name *P. graminea* but transferring two species, *B. obovata* and *B. scapigera* to the genus, the required new combinations being used on the determinavit slips. However, I have never validly published these combinations and refrain from doing so here.

## 69. *Brachyscome foliosa* P.S.Short, sp. nov.

**Type:** New South Wales, near Lake Cootapatamba, Mt Kosciuszko, 22 Mar. 1972, M. Gray & C. Totterdell 6632 (**holotype:** CANB 463542; **isotypes:** CHR n.v., G n.v., HO n.v., K n.v., MEL 720482, MO n.v., NSW n.v., S n.v.), distribution as indicated on holotype label.

*Brachyscome alpina* P.Morris, Victorian Nat. 41: 31, t. 1 (1924) (“*Brachycome*”), nom illeg. (later homonym of *B. alpina* Colenso). — **Type citation:** “Pretty Valley, Bogong Plateau, Victoria. Collected by H. B. Williamson.” **Lectotype** (Davis 1948, p. 153): Pretty Valley, Bogong Plateau, Victoria. Jan. 1923, H.B. Williamson (MEL 49281 p.p.). **Isolotype** (MEL 49281 p.p.).

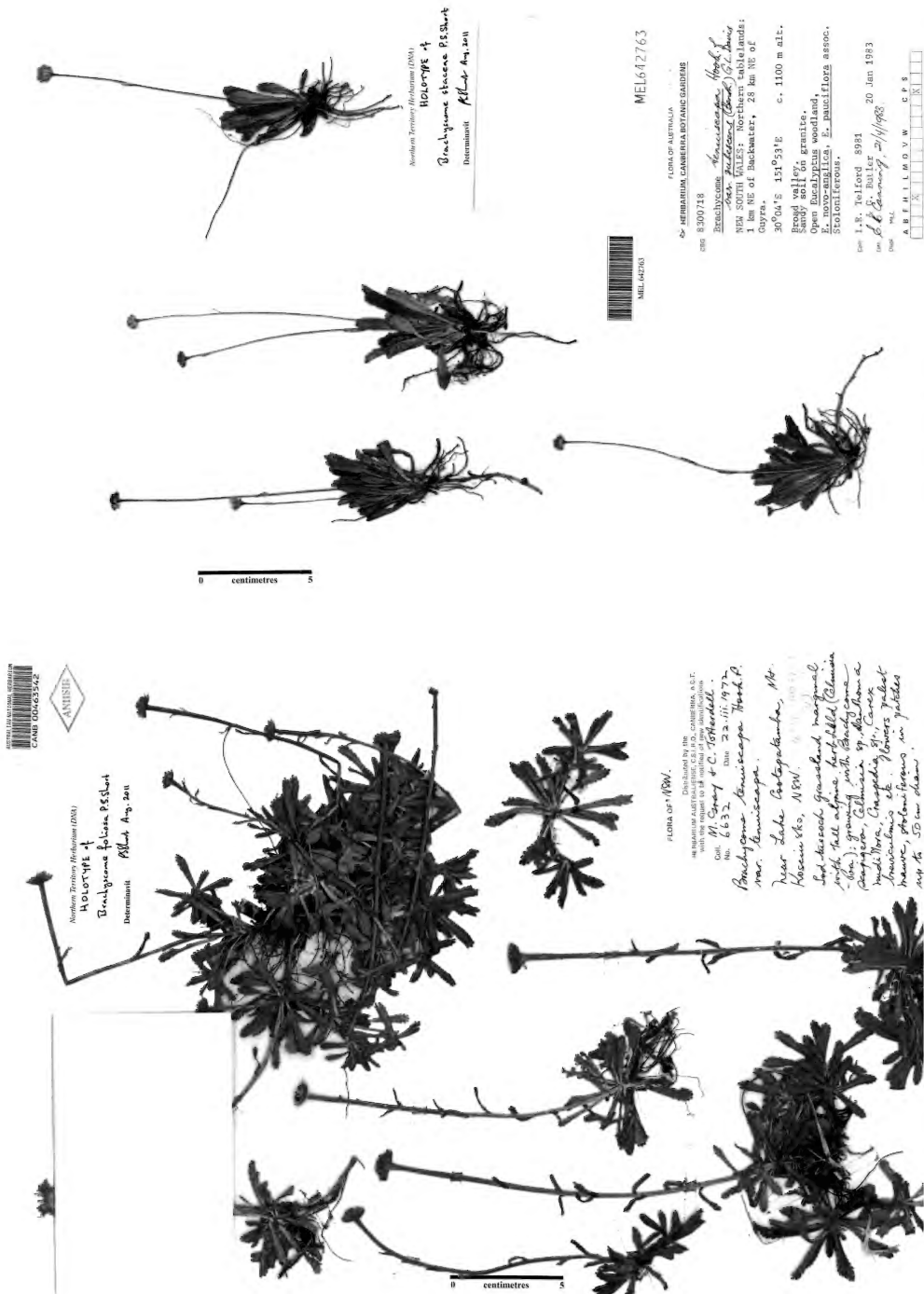
*Brachyscome* sp. 3: P.S.Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 858, Fig. 174d (1999).

*Brachyscome* sp. (aff. *tenuiscapa* Hook.f.): M.Gray in Costin et al., Kosciuszko Alpine Fl. 2nd ed. 188, 331 (2000).

[*Brachyscome tenuiscapa* var. *tenuiscapa* auct. non Hook.f. (all p.p., applying to mainland populations): G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 152 (1948) (“*Brachycome*”); J.H. Willis, Handb. Pl. Victoria 2: 665 (1973) (“*Brachycome*”); M.Gray in Costin et al., Kosciuszko Alpine Fl. 1st ed. 361, Fig. 300 (1979) (“*Brachycome*”); J.Everett in G.J.Harden, Fl. New South Wales 3: 159 (1992) (“*Brachycome*”); E.Salkin et al., Austral. Brachyscomes 230 (1995).]

Perennial, scapiform, stoloniferous herb often forming extensive patches. *Leaves* mainly in basal clusters, oblanceolate or spatulate, 15–38 mm long, 3–11 mm wide, pinnatilobed, with 5–13 lobes; leaf surfaces with sparse to somewhat dense indumentum of stalked glandular hairs; leaves basally not or slightly dilated, with or without scarious margins. *Scapes* 1 per rosette, c. 7–20 cm long, 0.8–2 mm diam., beset with stalked glandular hairs, and some scattered, long, septate, eglandular hairs, each scape with 3–16 oblanceolate, pinnatilobed or entire leaves. *Involute* 9–16 mm diam. *Bracts* c. 12–22, in about 1 row, of c. equal length, elliptic to narrowly elliptic, 4–6 mm long, 1.2–2 mm wide, thinly herbaceous, with narrow scarious margins and scarious apices, upper part of bracts often purplish, outer surface with sparse to somewhat dense indumentum of stalked glandular hairs, edges of bract margins with or lacking scattered stalked glandular hairs. *Receptacle* hemispherical, alveolate. *Ray corolla* c. 10 mm long, white or very pale mauve or violet. *Disc florets* 5-lobed. *Stamens* 5. *Style* appendages deltate, c. ½ the length of the stigmatic part. *Cypselas* somewhat flattened, obovate, 1.5–2.4 mm long, 0.8–1.2 mm wide, smooth, glabrous, ab/adaxial margins somewhat distinct from the body, blackish at maturity except for carpodium; pericarp with 2 vascular bundles, with an essentially continual, 1-cell thick, layer of sclerenchyma on the lateral surfaces; testa cells somewhat u-shaped to evenly thickened (N.H. Scarlett 83-70); carpodium annular, very narrow, whitish or pale brown-white. *Pappus* a short corona of teeth, 0.05–0.1 mm long. *Chromosome number:* 2n = 28. **Fig. 6F, 11F, G, 49.**

*Distribution.* An alpine species found in the Mt Kosciuszko region of New South Wales and the Bogong



High Plains, Dargo High Plains and Snowy Plains in Victoria.

**Habitat.** Tussock grassland and alpine herbfield. Associated species include *Brachyscome decipiens*, *B. scapigera*, *Carex breviculmis*, species of *Celmisia* and *Craspedia*, *Poa hiemata* and *Rytidosperma nudiflorum*.

**Phenology.** Flowering and fruiting from December to March.

**Cytology.** The only recorded chromosome number of this species is  $2n = 28$ , it being obtained from cultivated plants originally collected near Mt Reynard, Snowy Plains, Victoria (Watanabe et al. 1996b, as *Brachyscome tenuiscapa* aff. var. *tenuiscapa*). In Appendix 2 it is assumed to be a tetraploid based on  $x = 7$ .

**Notes.** This species is distinguished from *B. tenuiscapa*, the species to which it has been previously referred, by its blackish, not brown or purplish-brown fruit, its generally more robust habit, the usually larger number of leaves on the scape (for which the species is named), and the usually greater number of lobes on the largest leaves. Only several styles of this species and *B. tenuiscapa* were examined but it appears that they too differ, the appendages being deltate and about half the length of the stigmatic part in this species but triangular and about the length of the stigmatic part in *B. tenuiscapa*. *Brachyscome foliosa* is readily distinguished from *B. staceae* in having 3–16 entire or pinnatifid lobes on the scape, not just 1 or 2 entire leaves.

On the label for *R.J. Adair 1604* it was noted that a stoloniferous patch of this species contained up to 200 rosettes.

Two fruit from the holotype specimen are triquetrous. This is assumed to be an abnormality.

#### *Selected specimens examined.*

NEW SOUTH WALES: Spencers Creek, David Moraine, 16 Jan. 1953, *M. Mueller* 720 (NSW).

VICTORIA: Sun Valley, Bogong High Plains, 13 Feb. 1982, *R.J. Adair 1604* (MEL); east edge of Lankeys Plain, directly south of the hut beside the King Spur track, 19 Jan. 1983, *N.H. Scarlett 83-70* (MEL); Lankeys Plain, Dargo High Plains, 1 Jan. 1982, *N.G. Walsh 719* (MEL); Bogong High Plain, Dec. 1922, *H.B. Williamson* (CANB 190640, MEL 2034553); Cobungra, Dec. 1928, *H.B. Williamson* (MEL 49282).

#### **70. *Brachyscome graminea* (Labill.) F.Muell.**

First Gen. Rep. Govt Bot. 14 (1853) ("*Brachycome*"); F.Muell., *Fragm.* 1: 49 (1858) ("*Brachycome*"); Benth., *Fl. Austral.* 3: 515 (1867) ("*Brachycome*"), p.p., excluding specimens of *B. parvula* (e.g. MEL 692759); G.L.R.Davis, *Proc. Linn. Soc. New South Wales* 73: 169, Fig. 32, pl. vi, map 11 (1948) ("*Brachycome*"); J.H.Willis, *Handb. Pl. Victoria* 2: 668 (1973) ("*Brachycome*"); D.A.Cooke in Jessop & Toelken, *Fl. S. Austral.* 3: 1452, Fig. 655G (1986) ("*Brachycome*"); J.Everett in G.J.Harden, *Fl. New South Wales* 3: 158 (1992) ("*Brachycome*"); E.Salkin et al., *Austral. Brachyscomes* 126 (1995); P.S.Short in N.G.Walsh & Entwistle, *Fl. Victoria* 4: 858, Fig. 174c (1999). — *Paquerina graminea* (Labill.) Cass. ex Less., *Syn. Gen. Compos.* 193 (1832); J.D.Hooker, *Fl. Tasman.*

1: 188 (1856). — *Bellis graminea* Labill., *Nov. Holl. Pl.* 2: 54, t. 204 (1806). — **Type citation:** "in capite Van-Diemen." **Type:** *Fl. n.v.*, G-DC, ?P n.v. See notes.

*Paquerina graminea* var. *angustissima* Sond., *Linnaea* 25: 478 (1853) ("*Pacquerina*"). — **Type citation:** "Labill. l.c. Fig. sinistra.", i.e. Labill., *Nov. Holl. Pl.* 2: 54, t. 204 (1806), figure on left-hand side of tab.

*Paquerina graminea* var. *latifolia* Sond., *Linnaea* 25: 478 (1853) ("*Pacquerina*"). — **Type citation:** "Bugleranges, April." **Apparent syntype:** Halls Creek, *Anon.* (MEL 692758), see note below.

*Brachyscome angustifolia* A.Cunn. ex DC., *Prodr.* 5: 306 (1836) ("*Brachycome*"); Benth., *Fl. Austral.* 3: 514 (1867) ("*Brachycome*"). — *B. angustifolia* var. *angustifolia*: G.L.R.Davis, *Proc. Linn. Soc. New South Wales* 73: 161, Fig. 15, 26, pl. vi, map 7, pl. vii, 2 (1948) ("*Brachycome*"), p.p., excluding a few specimens of *B. triloba* from N.S.W.; W.M.Curtis, *Stud. Fl. Tasman.* 295 (1963) ("*Brachycome*"), but excluding specimens of *B. radicans*; J.H.Willis, *Handb. Pl. Victoria* 2: 669 (1973) ("*Brachycome*"), p.p., as to specimens such as those from Glenelg River, Morass Creek near Benambra, and Portland and excluding specimens of *B. willisii*. — **Type citation:** "in siccis glareosis apricis Novae-Hollandiae ad Goulburn Plains, maio flor. legit. cl. Cunningham, et in ins. Van-Diemen cl. Gunn ... (v.s. comm. à cl. Cunn. et Lindl.)." **Lectotype:** Goulburn Plains, May 1824, *A. Cunningham* (MEL). (Davis (1948, p. 161). **New lectotype (here designated):** Van Diemens Land, *R.C. Gunn 266* (G-DC). **Isolectotype:** K, see note below. **Remaining syntype:** Dry open gravelly downs, Goulburn Plains, N.S.W., May 1824, *A. Cunningham* (G-DC). **Probable remaining isotypes:** Goulburn Plains, *A. Cunningham* (K 000882208, K 000882210 K, 000882211), see note below, MEL.

Perennial herb with branches ascending or weakly erect, to c. 70 cm long, glabrous or variably glandular-pubescent. Leaves basal and cauline, mainly narrowly obovate or somewhat linear, 2–16 cm long, 0.1–1 cm wide, entire, not or somewhat succulent, glabrous or with scattered glandular hairs. *Involute* 5–8 mm diam. *Bracts* 13–20, somewhat elliptic, of c. equal length, in c. 1 row, 2.1–3.5 mm long, 0.7–1 mm wide, mainly herbaceous but with scarious margins, with glandular abaxially. *Receptacle* conical, glabrous. *Ray corolla* 6–9 mm long, white or mauve. *Disc florets* 5-lobed. *Stamens* 5; anthers c. 1.1 mm long, microsporangia c. 0.9 mm long, each with a sterile apical appendage c. 0.25 mm long. *Style* appendages shallowly deltate, shorter than stigmatic part. *Cypselas* obovoid to broadly obovoid, 1.6–2.4 mm long, 1–1.6 mm wide, ab/adaxial margins and more or less the lateral surfaces conspicuously swollen, entire cypselas brown, with long, biseriate glandular hairs usually conspicuous, cypselas somewhat sticky; pericarp with 2 vascular bundles; sclerenchyma restricted to ab/adaxial margins; testa cells evenly thickened (*P. Heyligers 84001*); carpodium absent. *Pappus* absent or of few inconspicuous bristles to c. 0.3 mm long. **Chromosome number:**  $n = 9$ . **Fig. 6G, 11H.**

**Distribution.** South Australia, New South Wales, the A.C.T., Victoria and Tasmania.

**Habitat.** Found in a range of habitats, from comparatively saline coastal marshes (e.g. Glenelg River mouth) and cliff faces exposed to salt spray (e.g. Green Cape) to high altitude, freshwater streams and swamps, as for example in the eastern highlands of Victoria.

**Phenology & reproductive biology.** Flowering has been recorded from October to May. The showy capitula are indicative of cross-pollination and this is supported by a pollen:ovule ratio of 2,234 determined from a capitulum of *P.S. Short 4015*; the capitulum had 13 ray and 24 disc florets.

Salkin et al. (1995) indicated that seed germinate well within 8–30 days of sowing.

**Cytology.** A collection from Robe, South Australia (*R.J. Millington*, AD 98669168) is accompanied by a note indicating that it is a voucher for a chromosome number determination of  $n = 9$  obtained in 1960 by Dr K. Abels. No published record of this determination has been seen. Published records confirming  $n = 9$  have been recorded for populations from New South Wales, i.e. from Backwater, Cullen Bullen, Jindabyne and Rules Point by Smith-White et al. (1970) and from Sawpit Creek and Green Cape by Watanabe et al. (1996b). An idiogram of somatic metaphase chromosomes was published by Watanabe et al. (1999, Fig. 35) for *P.S. Short 4015* from Green Cape.

**Nomenclature.** Cassini (1825) described the genus *Paquerina*, providing a description of the genus under the heading *Paquerina* and introducing the account with the statement “*La Bellis graminea* de M. Labillardière ... nous parait devoir constituer un nouveau genre”. However, from the examples given in Article 33.1 he cannot be deemed to have “definitely associate[d] the final epithet with the name of the genus” and thus, as noted by Chapman (1991, p. 2181) and Flann et al. (2010), authorship of the combination *Paquerina graminea* is not *P. graminea* (Labill.) Cass. in F.Cuvier, Dict. Sci. Nat. 37 (1825) 464, 492 but *Paquerina graminea* (Labill.) Cass. ex Less., Syn. Gen. Compos. 193 (Jul.–Aug. 1832).

**Typification of *Bellis graminea*.** Davis (1948) failed to locate any type specimen of *Bellis graminea* and therefore chose the plate (Nov. Holl. pl. 2: t. 204) as the lectotype. However, she seemingly did not check FI and following correspondence concluded that no authentic specimen is held in P. I have not checked the latter institution but have no reason to doubt that a specimen held in G-DC is a type, being obtained from P in 1821 and clearly labelled as being part of the collection made on the Bruni d’Entrecasteaux expedition to Australia, the expedition to which Labillardière was attached when he visited in 1792.

**Typification of *Paquerina graminea* var. *angustissima*.** When describing *P. graminea* var. *angustissima* Sonder made direct reference to Labillardière’s original description and illustration and was clearly applying his

name to the figure on the left-hand side of Labillardière’s tab. 204. Davis (1948, p. 171) erroneously considered she had seen “authentic syntype material” and chose a lectotype specimen for this name, i.e. Yarra, *Mueller* (GH), and placed the name in synonymy under *Brachyscome parvula* var. *parvula*.

**Typification of *Paquerina graminea* var. *latifolia*.** Davis (1948, p. 171) noted that she could not locate type specimens of *P. graminea* var. *latifolia* Sond. but suggested that they would be referable to *Brachyscome parvula*. However, an apparent syntype specimen, MEL 692758, has been located. It is labelled as var. *latifolia* and has the locality “Halls creek”. Bugle Ranges is situated on Hall’s Creek (Whitworth 1866) and thus it seems that this specimen is a syntype specimen of *Paquerina graminea* var. *latifolia* Sond., a conclusion also supported by the fact that it is evident from the label that Sonder adopted the varietal name *Mueller* used on the label. The specimen is very poor – with just one, immature and dissected capitulum occurring on the sheet – but it is undoubtedly referable to *B. graminea*.

**Typification of *B. angustifolia*.** When describing this species, Candolle studied specimens attributed to Allan Cunningham and Ronald Gunn and there is no evidence to suggest that he examined any specimens other than those in G-DC. Therefore, Davis erred when selecting Cunningham’s specimen in MEL as the lectotype. It should have been one of either the Cunningham or Gunn specimen held at G-DC. Both are mounted on the same sheet, with the general label “*Brachycome angustifolia* Cunn!” at the base. One specimen consists of three branchlets accompanied by a label reading “*Brachycome ?angustifolia/ C./ Dry open gravelly downs/ Goulburn Plains/ N.S. Wales/ May 1824*” and with the circled number “45” written directly on the sheet, the number being a shipping number, not a specimen number (A.E. Orchard pers. comm. 2013, Orchard 2012, Orchard & Orchard 2013). The other specimen is labelled in the one hand and in ink with the words “*Vandiem. M. Gunn./ env. par Lindley/ 1834*” with the number “266” added in pencil. The elements which comprise the Cunningham collection are in very poor condition, with the capitula smothered in glue, although the glandular indumentums and a single, distinctly glandular, immature cypselas visible in one capitulum leave no doubt as to its true identity being *P. graminea*. The cypselas on the Gunn specimen are also immature but it is a far better than Cunningham’s collection and I have therefore selected it as the new lectotype specimen of *B. angustifolia*.

Ronald Gunn did not use specimen numbers, but species numbers, and commonly collected the same species from two or more localities. Unless such specimens are clearly annotated with locality and/or date of collection it is not always clear when duplicates exist. However, having examined both the G-DC and K specimens and also compared photographs of them, I am of the opinion that the similarity is such

that a K specimen consisting of four elements and clearly labelled as *Gunn 266* should be regarded as an isocototype of the name *B. angustifolia*.

Of the Cunningham specimen in G-DC there appear to be several probable duplicates at K and MEL. One sheet at K contains five branchlets of this species and they are representative of two collections, one by Mueller from Omeo (K 000882209), the other by Cunningham (K 00882208). They are not clearly demarcated from each other but I tentatively suggest that only the element in the top right corner of the sheet pertains to Mueller's collection, the remaining four to Cunningham, for which the accompanying label records "Open downs of Goulbourn plains N.H."; of these elements the one in the lower right is basally labelled with the number "58". My attached note to this sheet indicates that I believed it, at the time of writing it in July 1992, was a collector's number. However, it appears that, as with the one in G-DC, it is a shipping number associated with Cunningham's separate distribution of specimens to England and to Candolle, with the separate specimens likely to have been part of a single gathering (A.E. Orchard, pers. comm. 2013; Orchard 2012, Orchard & Orchard 2013). The fragmentary nature of the specimen at MEL, together with it having the same locality data, suggest that it was once part of this K specimen.

Another sheet at K consists of three elements collected by Cunningham and belonging to this taxon. Presented to K by Heward, there are two labels accompanying the elements but they are not definitely linked with either of them but from JSTOR (accessed 28 Oct. 2013) it is evident that they are regarded as consisting of two specimens. One label has "... Goulbourn Plains ... April 1824" (listed as K 000882211) and is clearly not in agreement with the protologue whereas the other has "... Goulbourn Plains ... May 1824" (listed as K 000882210). Although the latter specimen and the one in G-DC are in agreement with the protologue in having the date of collection as May, the date must be a case of mislabelling. Cunningham was only on the Goulbourn Plains in April 1824. In early May he was in the Shoalhaven gullies and Razorback Ridge region, and by the 5th, back in Parramatta (Curry et al. 2002). Both of these specimens are here treated as probable remaining isosyntypes.

#### *Selected specimens examined.*

**SOUTH AUSTRALIA:** Cape Banks, 27 Feb. 1945, *J.B. Cleland* (AD 96307074); Robe, 18 May 1962, *D. Hunt* 833 (AD); Bool Lagoon, 1 Jan. 1964, *D. Hunt* 1768 (AD); Lake Bonney, 17 May 1981, *A.G. Spooner* 7752 (AD).

**NEW SOUTH WALES:** Narooma, 30 April 1966, *I. Beeton* (CBG 021052, NSW 131618); near Jindabyne, 25 March 1955, *E. Gauba* (CBG 012112); 1 mile S of Thomas's Lagoon, 4 May 1955, *M. Gray* 3218 (CANB, NSW); Green Cape Lighthouse, 7 Feb. 1993, *P.S. Short* 4015 (MEL).

**VICTORIA:** Shaw River, at Yambuk (38°19'S, 142°04'E, Grid E16), 1 April 1964, *H.I. Aston* 1165 (MEL); Livingstones Creek, 21 km SW of Omeo, 28 March 1973, *A.C. Beauglehole* 41711 (MEL); Rotamah Island, 8 Feb. 1987, *I. Crawford* 586 (MEL); Wilsons Promontory N.P., 10 Mar. 1984, *P.C.*

*Heyligers* 84001 (CANB, MEL); Albert Park, Jan. 1895, *J. Minchin* (BRI 296948, CANB 361229, MEL 692700, MEL 1506622, NSW 224138).

**TASMANIA:** Port Davey, 9 Jan. 1986, *A.M. Buchanan* 7735 (HO); Port Arthur, 1892, *J. Bufton* (MEL 692755); Smithton, May 1947, *W.M. Curtis* (HO 9814 & 9815); Macquarie Harbour, 18 Feb. 1847, *J. Milligan* 884 (MEL); George River, 1877, *A. Simson* (HO 142266).

#### **71. *Brachyscome obovata* G.L.R.Davis**

Proc. Linn. Soc. New South Wales 74: 146, Fig. 4, 5 (1949) ("*Brachycome*"); J.H. Willis, Handb. Pl. Victoria 2: 664 (1973) ("*Brachycome*"); M. Gray in Costin et al., Kosciusko Alpine Fl. 1st ed. 363, Fig. 303 (1979) ("*Brachycome*"), 2nd ed. 186, 332 (2000) (as Kosciuszko); J. Everett in G.J. Harden, Fl. New South Wales 3: 158 (1992) ("*Brachycome*"); E. Salkin et al., Austral. Brachyscomes 168 (1995); P.S. Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 856, Fig. 174a (1999). — **Type citation:** "*Holotype:* Echo Flat, Lake Mountain, about 4,700 ft., margin of alpine sphagnum bogs, 25.1.1948, J.H. Willis (MEL). *Paratypes:* Two, loc. cit. (MEL)."  
**Holotype:** MEL 220647 p.p., excl. isotypes. **Isotypes:** BRI 127380, NSW 15571, MEL 220647 p.p. (excl. holotype), MEL 658088.

[*Brachyscome nivalis* var. *alpina* auct. non (Benth.) G.L.R.Davis: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 198 (1948) ("*Brachycome*"), as per excluded syntype from Mount Baw Baw. Also see under *B. tadgellii*.]

Perennial, rhizomatous *herb* to c. 45 cm tall. *Leaves* mainly in a basal cluster, linear or linear-oblongate, entire, 40–250 mm long, 1–3 (6) mm wide, glabrous, basally dilated. *Scapes* 1–3 per tuft, usually glabrous but sometimes with a few scattered, stalked glandular hairs, each scape with (2) 3–9 leaf-like bracts less than 10 mm long. *Involucre* 5–10 mm diam. *Bracts* 16–29, more or less in a single row, mainly obovate, 4.3–7 mm long, 1.1–2.7 mm wide, mainly green, with scarious, often purplish margins, sometimes purplish throughout, somewhat acute to obtuse, bract entire, glabrous or with few stalked glandular hairs. *Receptacle* convex to subconical, alveolate. *Ray florets* c. 25–30; corolla 10–13 mm long, 1.4–2.8 mm wide, white or tinged mauve or purple, obscurely 2- or 3-lobed at apex, veins 4 or 5 (6). *Disc florets* c. 50–70; corolla tube 1.6–2.3 mm long, 5-lobed, yellow. *Stamens* 5; anthers c. 1.5 mm long, microsporangia c. 1 mm long, each with a sterile apical appendage c. 0.4 mm long. *Style* with sterile apical appendages narrowly triangular, longer than stigmatic part. *Cypselas* somewhat flattened, obovate, 2–2.9 mm long, 1–1.6 mm wide, lateral surfaces smooth, entire fruit glabrous, brown, lacking externally well-defined ab/adaxial margins; pericarp with sclerenchyma confined to ab/adaxial margins, with 2 vascular bundles; testa with evenly thin-walled cells (*P.S. Short* 1122); carpodium indistinct but appears to be present. *Pappus* of c. 15 scale-like bristles 0.1–0.3 mm long. *Chromosome number:* *n* = 9. **Fig. 6H.**

**Distribution.** Confined to the high country of eastern Victoria, the ACT and south-eastern New South Wales.



**Habitat.** Subalpine heathland, sphagnum bogs, *Carex* fen and the margins of streams. Observations suggest that when the two are sympatric it grows in wetter areas than *B. scapigera*.

**Phenology & reproductive biology.** Flowering recorded from late October to April but most records are from January and February.

Salkin et al. (1995) recorded that seed sown soon after collection readily germinated within 14 days while other seed took 5–7 months.

**Cytology.** Diploid determinations of  $2n = 18$  were recorded by Watanabe et al. (1996b) for two populations from Mt Kosciuszko N.P. in N.S.W. and from the Baw Baw Plateau in Victoria. An idiogram of somatic metaphase chromosomes from the latter locality has been published in Watanabe et al. (1996a, Fig. 13) and Watanabe et al. (1999, Fig. 33).

**Notes.** The species is undoubtedly closely related to *B. scapigera*. They are usually easily distinguished from each other by the presence in *B. scapigera*, and absence in *B. obovata*, of leaf remains at the base of plants; in *B. obovata* the leaves are also normally linear while in *B. scapigera* leaves are oblanceolate or spatulate. The number of bracts on the scape is also a most useful feature for distinguishing the species, although some specimens that otherwise clearly have the above attributes of *B. scapigera* occasionally have about six bracts, whereas they normally have fewer than three. There is also a tendency for the bracts of *B. obovata* to be apically somewhat acute rather than obtuse and they generally have a more poorly developed vascular system than those in *B. scapigera*.

The observation that the testa walls are thin in *B. obovata* and even thickened in *B. scapigera* is only based on the transverse section of a single cypsela of each species.

The specific epithet, *obovata*, was undoubtedly applied by Davis to the fruit of the species, an unfortunate choice as they are very similar in outline to *B. scapigera*.

#### *Selected specimens examined.*

NEW SOUTH WALES: below Etheridge Ridge, Mt Kosciuszko region, 19 Feb. 1969, *M. Gray & C. Totterdell* 6358 (CANB, NSW); Mt Kosciuszko NP, between Blue Lake & Charlotte Pass, 5 Feb. 1993, *P.S. Short* 3997 (CANB, MEL, NSW, TI).

AUSTRALIAN CAPITAL TERRITORY: Murray's Gap, Bimberi Range, 3 Mar. 1987, *P. Gilmour* 6183 (MEL).

VICTORIA: S edge of Mustering Flat, Mt Baw Baw region, 19 Feb. 1980, *P.S. Short* 1122 (MEL).

#### **72. *Brachyscome radicata* Hook.f.**

Fl. nov.-zel. 1: 127 (1852) ("*Brachycome*"). — *Brachyscome odorata* Hook.f., Handb. N. Zeal. Fl. 138 (Sept.–Oct. 1864) ("*Brachycome*"), nom. illeg. — **Type citation:** "Northern Island, Cunningham, Colenso. Middle Island, Lyall." **Lectotype (here designated):** New Zealand, Colenso 1732 (K 000890231). **Probable islectotype:** AK 9377, only seen on JSTOR. See notes below.

*Brachyscome thomsonii* Kirk, Trans. & Proc. New Zealand Inst. 16: 372, pl. 27 (1884) ("*Brachycome*"). — *Brachyscome radicata* var. *thomsonii* (Kirk) Allan, Fl. New Zealand 1: 600 (1961) ("*Brachycome*"). — **Type citation:** "Stewart Island". **Lectotype:** Stewart Island, T. Kirk (AK 9380 p.p., only seen on JSTOR). (Davis 1949, p. 100). **Isolectotypes:** AK 9380 p.p., excluding lectotype, K, MEL 220628.

*Brachyscome polita* Kirk, Stud. Fl. New Zealand 261 (1899) ("*Brachycome*"). — *Brachyscome thomsonii* var. *polita* (Kirk) Cheeseman, Man. New Zealand Fl. 277 (1906). — **Type citation:** "South Island: Arthur's Pass, T.K. 3,000 ft. Dec." **Lectotype:** Arthurs Pass, T. Kirk (AK n.v.). (Davis 1949, p. 100).

*Brachyscome thomsonii* var. *dubia* Kirk, Stud. Fl. New Zealand 261 (1899) ("*Brachycome*"). — *Brachyscome radicata* var. *dubia* (Kirk) Allan, Fl. New Zealand 1: 601 (1961) ("*Brachycome*"). — **Type citation:** "Otago: cliffs near Cape Whanbrow, T.K. Near Green Island, Petrie!" **Lectotype:** Cape Whanbrow, T. Kirk (AK n.v.). (Davis 1949, p. 100).

*Brachyscome thomsonii* var. *membranifolia* Kirk, Stud. Fl. New Zealand 261 (1899) ("*Brachycome*"). — *Brachyscome radicata* var. *membranifolia* (Kirk) Allan, Fl. New Zealand 1: 600 (1961) ("*Brachycome*"). — **Type citation:** "Mount Arthur Plateau, Cheeseman! Dunedin, Petrie!" **Lectotype:** Mt Arthur Plateau, Nelson, 4,000'. i.1886, T.F. Cheeseman (AK n.v.). (Davis 1949, p. 100).

?*Brachyscome thomsonii* var. *minima* Kirk, Trans. & Proc. New Zealand Inst. 16: 372 (1884) ("*Brachycome*", as "*B. minima*"); Kirk, Stud. Fl. New Zealand 260 (?1898). — **Type citation:** "B. Dog Island." Type not seen, and not located by either Davis (1949a) or Allen (1961). Kirk's reference to "rays florets wanting" suggests that it does not belong here.

Perennial, scapiform or sparingly branched *herb* with weak to erect major axes, probably rhizomatous or stoloniferous. *Leaves* spatulate or oblanceolate, c. 15–85 mm long, 3–20 mm wide, uppermost leaves on scape often entire but most leaves with 3–12 lobes, glabrous or with a scattered to obvious cover of long-stalked glandular or eglandular, tapering hairs with flat or conical, biseriate or multiseriate, bases. *Scapes* or flowering axes with a dense indumentum, on at least the upper part, of stalked glandular hairs, with or without a few to numerous eglandular hairs; eglandular hairs 0.5–1.1 mm long, uniseriate, multiseptate or with bi- or multiseriate bases, tapering to a uniseriate flagellum-like apex; glandular hairs c. 0.05–0.7 mm long, with or without pronounced white conical bases. *Involucre* c. 10 mm diam. *Bracts* c. 12–18, oblong, ovate-lanceolate, elliptic to narrowly elliptic, or obovate to oblanceolate, 2.7–5.7 mm long, 1.1–2.2 mm wide, with whitish or pale brown (at least when dry) non-herbaceous margins, with a darker brown sterome and diffuse purplish apices, glabrous or with few scattered glandular and eglandular hairs basally or on margins and midrib. *Receptacle* areolate, glabrous. *Ray florets* with corolla c. 5–8 mm long, white or with pink, violet or purple flushing, veins 4, tubular part with long glandular hairs, apically rounded, unlobed. *Disc florets* with corolla tube 5-lobed, 1.5–2.1 mm long, yellow. *Stamens* 5; anthers

1.13–1.17 mm long; microsporangia 0.78–0.95 mm long; apical appendage somewhat triangular, 0.22–0.35 mm long. *Style* c. 2.1 mm long, arms c. 0.7 mm long, the somewhat triangular apical appendage slightly shorter to slightly longer than the stigmatic portion. *Cypselas* obovate, 2.6–3.6 mm long, 0.85–1.45 mm wide, dark brown, unwinged, ab/adaxial margins not or only slightly pronounced, at least the apex and margins beset with many shortly stalked glandular hairs, with few to many on the faces; pericarp with 2 vascular bundles, sclerenchymatous cells restricted to ab/adaxial margins, secretory canals absent; testa cells with evenly thickened walls (*A.P. Druce*, CHR 190628; *L. Rodway*, HO 9800); carpopodium distinct, annular, narrow, yellow-brown, glabrous. *Pappus* a small, jagged, erect to somewhat spreading whitish crown 0.2–0.25 mm tall. *Chromosome number*:  $2n = 90$  and c. 90. **Fig. 61.**

**Distribution.** New Zealand and Tasmania, at least under the broad circumscription adopted here. In New Zealand known from North, South and Stewart islands. Tasmanian populations are only known to me from three localities: between Cradle Mtn and Moina, at the base of Mt Inglis, and from Mt Wellington. McEvoy (1990) indicated that the population(s) from sawpits from Mt Wellington may be extinct. Anonymous (2003) gives more information, including a map, as to the distribution of the species in Tasmania.

**Habitat.** In New Zealand recorded as occurring in a range of habitats from sea level to 1800m, i.e. in “forest margins and clearings, coastal sites, grassland, herbfield, cliffs, banks and riverbeds” (Webb 1988, p. 185). In Tasmania there is little information pertaining to the habitat. Rodway made the only collections from Mt Wellington but merely recorded the habitat as “subalpine”. Of the Cradle Mtn collection it was noted that plants were growing in an “alpine woodland with grassy sward” (*N.T. Burbidge* 3536) while the Mt Inglis plants were in “cliff base detritus, seepage” (*A. Moscal* 2047).

**Phenology.** Flowering and fruiting specimens have generally been collected from November to April.

**Cytology.** Chromosome numbers of  $2n = 90$  and c. 90, have been recorded for *B. radicata* collected from both the North and South islands of New Zealand (Beuzenberg & Hair 1984, Dawson & Beuzenberg 2000, de Lange & Murray 2002, Fig. 1d).

**Nomenclatural notes.** The synonymy as given above is often based on original descriptions, type specimens having only been examined for several taxa. However, I have seen type specimens of *B. radicata* and *B. thomsonii*.

**Nomenclatural notes for *B. radicata*.** The name *Brachyscome radicata* was originally attributed by Joseph Hooker to specimens collected by Allan Cunningham, William Colenso and David Lyall, with all specimens

initially believed to have come from New Zealand. However, Hooker subsequently replaced the name *B. radicata* with the name *B. odorata* Hook.f. When so doing, Hooker made it clear that he had based the name *B. odorata* on the Colenso specimen and that “The *B. radicata* of the Fl. N.Z. was founded partly on this, and partly on specimens of a *Brachycome* in A. Cunningham’s herbarium, which I am now convinced were introduced by accident, and belong to an Australian species. The name of *B. radicata* had therefore better be abandoned” (Hooker 1864, p. 138). The name *B. odorata* was adopted by Kirk (1899) but Davis (1949a) correctly used the earlier name.

Davis (1949a), when carrying out her revision of *Brachyscome*, did not examine specimens at K but nominated a “haptotype” specimen for both names, *B. radicata* and *B. odorata*. The specimen which she chose (*W. Colenso* 1732) was, and presumably still is, housed in Auckland (AK) and is annotated as coming from Patea, Wellington Province. It is probably safe to assume that it is a duplicate of the Colenso specimen at K which is here chosen as the lectotype of the names *B. radicata* and *B. odorata* nom. illeg.

The lectotype specimen at K bears the label “1732/ Bellis/Nov. Zealandia/WC” and, directly on the sheet, there are two annotations “New Zealand/Colenso” and “*Brachycome odorata*”; in the case of the latter annotation the name “*odorata*” is written over the original name, “*radicata*”. For the sake of stability there is no doubt that this is the specimen which should be chosen as the lectotype of the name *B. radicata*. Hooker (1864, p. 138, cited above) had already indicated that the Cunningham specimen should be excluded from *B. radicata*, and his wording in that publication indicates that, contrary to his original publication, he also excluded a Lyall specimen from “Middle Island” from *B. radicata*. In any case, I have not seen Lyall’s Middle Island specimen at K, a fact which also excluded it from consideration as a lectotype specimen of the name *B. radicata*.

I do not consider Allan (1961, p. 599) to have chosen the lectotype specimen of *B. radicata*, but merely to have indicated with the words “Type: K, *Colenso* 1732”, the location of the type specimen. Indeed, his wording in the protologue that “the specimens [my emphasis] at K cited above are here regarded as including the type of both *B. radicata* and *B. odorata*” makes it clear that this is the case. Allan was presumably of the opinion that a single element (plant) on the sheet of *W. Colenso* 1732 should be regarded as the principal type (but which one wasn’t indicated) whereas I here include all elements on the sheet as constituting the lectotype. In regarding the AK specimen as being a probable isolectotype and not a definite isolectotype of the name *B. radicata* I have been influenced by Allan who recorded that “The specimens in A [=AK] are quite comparable and probably from the same gathering” (Allan 1961, p. 599) as that at K.

*Notes.* Specimens referred to this species are characterised by having laterally compressed, somewhat obovoid cypselas that are viscid and covered in biseriate glandular hairs. The delimitation of the species is problematical. Davis (1949a) adopted a broad circumscription and listed three species – *B. polita* Kirk, *B. thompsonii* Kirk (including several varieties), and *B. odorata* Hook.f., the last an illegitimate name – in synonymy under *B. radicata*. She noted that although there is variation in indumentum which may have a genetical basis the “variation within this species is not great” and that the “variation in size and shape of leaves is no more than would be expected in a species occupying a variety of habitats in a relatively extensive range” (Davis 1949a, p. 101). She opted not to recognise any infraspecific taxa, a move in contrast to Allan (1961) who somewhat tentatively accommodated the variation under five varieties, using aspects of the indumentum and variation in fruit turgidity (probably related to maturity), branching and leaf placement to recognise them. However, Webb (1988) followed Davis and recognised no infraspecific taxa but also noted that “plants may be almost glabrous or have short glandular hairs ... or may be densely covered in long-stalked multicellular glandular hairs” (Webb, 1988, p. 185).

I have not closely examined many specimens of *B. radicata* s.lat. from New Zealand, with many on loan being returned to CHR – including *A.P. Druce* (CHR 190628) from which a single fruit was sectioned – before I had studied them in detail. However, from study of specimens at HO, K and MEL I can recognise three entities. The first, as represented by specimens (*L.B. Moore*, HO 117315 & 117316) from Ruahine Range in the North Island appear to me to be representative of *B. radicata* s.str., plants with weakly ascending stems and branches, their scapes with a dense indumentum of short glandular hairs below the capitulum, the hairs mostly less than or barely 0.1 mm long, each with the stalk usually about the length of the terminal, spherical yellowish gland, the majority of the scape with scattered glandular hairs and sometimes with a few fine, uniseriate, multiseptate, whitish eglandular hairs to c. 0.7 mm long and which are uniformly wide along their length. A second entity, noted from the South Island and represented by specimens from Boyle River (*W.B. Brockie* HO 117519) and Cat Creek (*H.H. Allan* CHR 112459), is a far more robust plant than *B. radicata* s.str. and the leaves and scapes have a prominent indumentum of linear or linear-triangular glandular hairs, the smallest c. 0.2 mm but mostly 0.4–1 mm long, their stalks whitish, flat, biseriate and multiseptate. The third entity is from Stewart Island and as with the aforementioned entity the plants are robust. However, their indumentum is different, the glandular hairs to only c. 0.35 mm long, their stalks being whitish, biseriate or perhaps basally multiseriate. The stalks of the larger hairs may be subconical. This third entity

equates with the synonymised *B. thompsonii*, for which I have seen *T. Kirk* 576 (AD) and an islectotype (*T. Kirk* MEL 220628).

The Tasmanian specimens are not dissimilar to those from New Zealand, and in habit and leaf shape seem to be indistinguishable from the entities from South and Stewart Islands but, as in New Zealand, they also display great variation in indumentum. The collection from Mt Inglis is quite distinctive in that the upper part of the scapes are beset with a dense indumentum of eglandular hairs and manifestly shorter glandular hairs, the eglandular hairs being 0.5–1.1 mm long and having whitish, multiseriate conical bases and tapering to a uniseriate flagellum-like apex while the glandular hairs are c. 0.1–0.45 mm long, with at least the largest hairs having conical bases. In contrast, the glandular hairs on the scapes of plants from the Cradle Mtn area rarely have pronounced conical bases and, although eglandular hairs occur, they too do not have long, pronounced conical bases. In specimens from Mt Wellington glandular hairs with conspicuous conical bases are common but eglandular hairs similar to those found in the Mt Inglis specimens are uncommon.

With its prominent vestiture of conical-based eglandular hairs I considered naming at least the Mt Inglis material as a distinct variety but, in view of the great deal of variation found in both New Zealand and Tasmania, refrained from doing so. This decision also reflects the fact that I have seen few specimens and have had no opportunity to assess variation in populations in either New Zealand or Tasmania.

*Brachyscome radicata* s.lat. was first collected in Tasmania in 1893 by Leonard Rodway, specimens being obtained from the Mt Wellington region. Rodway subsequently recollected it from the same locality – perhaps the same population – in 1894 and 1913. Intriguingly, he never accounted for the specimens in his flora (Rodway 1903). His granddaughter, Gwenda Davis, was also apparently unaware of the specimens as she too failed to refer to them in either of her main treatments of *Brachyscome* in Australia (Davis 1948) and New Zealand (Davis 1949a), nor in subsequent supplementary papers describing new taxa and listing new records (Davis 1949b, 1955, 1959).

#### *Additional specimen examined.*

NEW ZEALAND: Cat Creek, Tarndale, 2 Apr. 1946, *H.H. Allan* (CHR 112459); Boyle River, North Canterbury, 18 Nov. 1958, *W.B. Brockie* (HO 117519); Patersons Inlet, Stewart Island, *T. Kirk* 576 (AD); Reporoa Bog, NW Ruahine Range, North Island, 2 Jan. 1959, *L.B. Moore* (HO 117316); Reporoa Stream, NW Ruahine Range, North Island, 4 Jan. 1959, *L.B. Moore* (HO 117315).

TASMANIA: between Cradle Mt & Moina, 1 Feb. 1949, *N.T. Burbidge* 3536 (CANB 26813); Mt Inglis, 26 Feb. 1983, *A. Moscal* 2047 (HO 92667); The Sawpits, Mt Wellington, Apr. 1893, *L. Rodway* (HO 9798); Mt Wellington (sub-alpine), Jan. 1894, *L. Rodway* (HO 58911, MEL 692709); above Sawpits, Mt Wellington, Apr. 1913, *L. Rodway* (HO 9800).

**73. *Brachyscome scapigera* (Sieber ex Spreng.) DC.**

Prodr. 7: 277 (1838) ("*Brachycome*"); Benth., Fl. Austral. 3: 513 (1867) ("*Brachycome*"); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 154, Fig. 5, 9, pl. vi, map 2, pl. vii, 1 (1948) ("*Brachycome*"); M.Gray in Costin et al., Kosciuszko Alpine Fl. 1st ed. 362, Fig. 302 (1979) ("*Brachycome*"), 2nd ed. 186, 332 (2000) (as Kosciuszko); J.Everett in G.J.Harden, Fl. New South Wales 3: 158 (1992) ("*Brachycome*"); E.Salkin et al., Austral. Brachyscomes 206 (1995); P.S.Short in N.G. Walsh & Entwisle, Fl. Victoria 4: 856, Fig. 174b (1999). — *Senecio scapiger* Sieber ex Spreng., Syst. Veg. 3: 559 (1826). — *Brachystephium scapigerum* (Sieber ex Spreng.) DC., Prodr. 6: 304 (Jan. 1838). — **Type citation:** "Nov. Holland." **Lectotype:** Fl. Novae Holl. No. 332, 1825, Sieber (G-DC). (Davis 1948, p. 154, p. vii no. 1). **Isolotypes:** G 00222778, G 00222779, GH-HUH 00012321 (kiki.huh.harvard.edu/databases/specimen\_search.php?fragmentid=9467; accessed March 2013); K, W (two sheets). **Presumed islectotype:** New Holland, Sieber (W).

Perennial, rhizomatous herb (4) 10–48 cm tall, base of plant surrounded by remains of old leaves. *Leaves* mainly in basal tufts, oblanceolate or subspathulate, entire, 2.5–24 cm long, 0.4–1.4 cm wide, dilated at base, glabrous or rarely with some stalked glandular hairs. *Scapes* 1–6 per tuft, each usually with just 1 or 2 (rarely more) small bract-like leaves, glabrous or with few to many, somewhat densely-spaced, stalked glandular hairs. *Involucre* 6–11 mm diam. *Bracts* 14–25, in about a single row, obovate, ovate or elliptic, 3.2–6.6 mm long, 1.7–3.5 mm wide, mainly green, often with vascular system prominent, margins scarious, often purplish, apex generally obtuse, entire bract glabrous or with few stalked glandular hairs. *Receptacle* convex to subconical, alveolate. *Ray florets* 45–90; corolla 6.1–10.7 mm long, 1.1–1.8 mm wide, white or mauve. *Disc florets* 50–160; corolla tube 2.2–3 mm long, 5-lobed, yellow. *Stamens* 5; anthers 1.25–1.83 mm long, microsporangia 0.95–1.49 mm long, each with a sterile apical appendage 0.23–0.38 mm long. *Style* 1.9–2.3 mm long, branches 0.8–1 mm long, sterile apical appendages triangular, longer than stigmatic part. *Cypselas* monomorphic, flattish, obovate, 1.7–2.6 mm long, 0.9–1.3 mm wide, lateral surfaces smooth, entire fruit glabrous, brown or purplish-brown, lacking externally well-defined ab/adaxial ribs; pericarp with 2 vascular bundles, sclerenchyma restricted to ab/adaxial margins; testa with evenly thickened cell walls (*R. Jackson CBG 179*; *P.S. Short 3115*); carpogonium present. *Pappus* a minute crown of scale-like bristles barely 0.1 mm long. *Chromosome number:*  $n = 9$ . **Fig. 12A, B.**

**Distribution.** Occurs in south-eastern Queensland, eastern New South Wales, the A.C.T. and eastern Victoria.

There are specimens in BRI and NSW labelled as having been gathered by H.B. Williamson in 1903 and 1904 from the Grampians, Victoria but in the absence of more recent collections confirming this I believe it best to consider the specimens to have been erroneously

labelled, albeit that there is also a major disjunction between New England and Queensland populations and those from southern New South Wales and Victoria.

**Habitat.** Common in alpine grasslands, herbfields, boggy heathlands and swamp margins but also on swampy ground in lower montane regions.

**Cytology.** A haploid chromosome number of  $n = 9$  has been recorded throughout much of the range of the species, i.e. from Armidale, Backwater, Ben Bullen, Ebor and Mt Kosciuszko in New South Wales, Callemondah in the A.C.T., and Bogong National Park in Victoria (Smith-White et al. 1970, Watanabe et al. 1996b). An idiogram of somatic metaphase chromosomes from a population near Backwater, N.S.W. (*P.S. Short 3972*) was published by Watanabe et al. (1999, Fig. 32).

**Phenology and reproductive biology.** Flowering has been recorded from mid-October at Brindabella to as late as May at O'Hara Head and Bega Swamp but the majority of collections are from alpine habitats where flowering is mostly from late December to March.

Pollen:ovule ratios determined from 15 individuals of *P.S. Short 3115* ranged from 1,718 to 3,282.

**Typification.** In his original description Sprengel merely cited "Nov. Holland" and attributed the name to Sieber. Subsequently, Candolle (1838, p. 304) recorded "*Senecio scapiger* Sieb. pl. exs. nov. holl. n. 332 ..." and Davis (1948) selected the specimen in G-DC as the lectotype. In accepting the lectotypification I am assuming that there is no other extant Sieber specimen which can unequivocally be stated to have been seen by Sprengel. It is not clear to me whether Sprengel actually saw any of the above cited specimens. — Stafleu & Cowan (1976–1988) indicated that Sprengel's *Compositae* were sold to Schultz-Bipontinus and, via the herbarium Cosson, are now in the general herbarium at P; Davis (1948) made no mention of there being a type specimen of *Senecio scapigera* in P and a search of the JSTOR website in March 2013 failed to reveal such a collection.

**Notes.** Close to *B. obovata*; see notes under that species.

**Selected specimens examined.**

QUEENSLAND: Stanthorpe, *H. Tryon* (BRI 331287).

NEW SOUTH WALES: below Charlotte's Pass, Kosciuszko N.P., 19 Feb. 1980, *P. Barnsley 1303* (CBG); 3.5 km NW of Backwater, 30 Jan. 1993, *P.S. Short 3972* (AD, CANB, MEL, NSW, TI).

AUSTRALIAN CAPITAL TERRITORY: Mt Murray, Bimbari Range, 12 Feb. 1988, *P. Gilmour 6611* (CBG).

VICTORIA: Mt Stirling, 8 Mar. 1953, *R. Melville 3235* (MEL, NSW); Buckety Plains, 21 Jan. 1988, *P.S. Short 3115* (MEL).

**74. *Brachyscome staceae* P.S.Short sp.nov.**

**Type:** New South Wales. Northern Tablelands, 1 km NE of Backwater, 28 km NE of Guyra, 30° 04'S, 151° 53'E, c. 100 m alt., open *Eucalyptus* woodland, *E. nova-anglica*, *E. pauciflora* assoc., sandy soil on

granite, 20 Jan. 1983, I.R. Telford 8981 & G. Butler (**holotype**: MEL 642763; **isotype**: CANB n.v.).

*Brachyscome decipiens* var. *pubescens* Benth., Fl. Austral. 3: 517 (1867) (“*Brachycome*”) — *Brachyscome tenuiscapa* var. *pubescens* (Benth.) G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 153, Fig. 4, pl. vi, map 1 (1948) (“*Brachycome*”); J.Everett in G.J.Harden, Fl. New South Wales 3: 160 (1992) (“*Brachycome*”); E.Salkin et al., Austral. Brachyscomes 232 (1995). — **Type citation**: “New England, C. Stuart.” **Holotype**: K 000882219. **Possible isotypes**: MEL 49287, MEL 49293, MEL 1562443 p.p., NSW 15068 (ex MEL). See notes below.

Perennial, scapose, stoloniferous herb. Leaves in basal clusters, oblanceolate or spatulate, 30–150 mm long, 5–20 mm wide, distally (the upper c. ½) always or mostly shallowly lobed, with 3–15 lobes; leaf surfaces with a sparse to somewhat dense indumentum of stalked glandular hairs; leaves basally not or slightly dilated. Scapes 1 or 2 per rosette, c. 5–21 cm long, 0.8–1.2 mm diam., beset with stalked glandular hairs generally of variable length, rarely more than c. 0.2 mm long, each scape with or without 1 or 2 linear, undivided leaves. Receptacle hemispherical, glabrous. Involucre c. 5–10 mm diam. Bracts c. 12–16, in more or less 1 row, of c. equal length, elliptic to narrowly elliptic or ovate-lanceolate, 3.7–4.6 mm long, 1.2–1.7 mm wide, herbaceous, with narrow scarious margins and apices, bracts often purplish distally, outer surface glabrous or with sparse to somewhat dense stalked glandular hairs, bract margins with or lacking scattered stalked glandular hairs. Ray corolla c. 10 mm long, mauve or blue. Disc florets 5-lobed. Stamens 5. Style appendages triangular, c. ¾ the length of the stigmatic part. Cypselas somewhat flattened, obovate, 1.2–1.7 mm long, 0.6–0.9 mm wide, smooth, glabrous, ab/adaxial margins somewhat distinct from the body, cypselas blackish at maturity except for carpodium; carpodium a poorly developed, whitish ring. Pappus a short corona of several to many teeth c. 0.05–0.1 mm long or sometimes seemingly absent. Chromosome number:  $n = 9$ . **Fig. 50.**

**Distribution.** South-eastern Queensland (Stanthorpe region) and the New England region of north-eastern New South Wales.

**Habitat.** A species of eucalypt woodland, including that on sandy soil over granite, but also recorded from heavier soils.

**Phenology and reproductive biology.** Most flowering records are from late September to February, with one flowering collection gathered in April.

Salkin et al. (1995, as *B. tenuiscapa* var. *pubescens*) recorded that seed germinates in 16–40 days.

**Cytology.** A haploid chromosome number of  $n = 9$  was recorded from populations near Armidale and Ebor (voucher not seen) by Smith-White et al. (1970, Fig. 1) and from near Backwater by Watanabe et al. (1996b), with all counts published under the name *B. tenuiscapa* var. *pubescens*. Watanabe et al. (1999, Fig. 17) published

an idiogram of somatic metaphase chromosomes of this taxon.

**Typification of** *Brachyscome decipiens* var. *pubescens*. Bentham appears to have described *Brachyscome decipiens* var. *pubescens* on the basis of a single specimen at K (K 000882219), there being no indication on the possible isotypes at MEL and NSW that he examined them. The sheet MEL 1562443 contains two labels, one giving the location as Timbarra and another as New England, and parts of three different species of *Brachyscome* s.lat., i.e. *B. aculeata*, *B. scapigera* and a single rosette of this species. The sheet MEL 49287 has seven rosettes of this species attached to it and two labels, one on a printed “Phytologic Museum of Victoria” label recording “C. St. New England” and another handwritten label recording “swamp nr. Tenterfield, Oct., 925, fl. Blue”. The sheet MEL 49293 contains three rosettes – each with a long scape devoid of a capitulum and with no bracts, florets or fruit in the fragment bag – that vegetatively are in accord with the above MEL specimens. This sheet contains two labels, one probably an original blue label with the handwritten note “*Brachycome* 151” and what appears to be the locality “Clifton”. The other label is on a printed “Botanical Museum of Melbourne” label and simply records “*Brachycome*/New England.C.St.”

There are several homesteads in the New England area with the name of Clifton and Stuart is also known to have collected “about Timbarra, Tenterfield district, and other parts of northern New England” (Maiden 1908, p. 125). From the information available it appears that Mueller or someone else at MEL added the generalised location “New England” to Stuart’s specimens and sent duplicates with this general locality information to K and NSW. As the exact locality was not recorded for the holotype specimen at K it is not possible to know which specimens, if any, at MEL and NSW are definite isotypes.

**Etymology.** The name honours Dr Helen Stace for her general work on the cytology of *Brachyscome* s.lat. (Smith-White et al. 1970) and her biosystematic studies of the *B. aculeata* group (Stace 1981).

**Notes.** *Brachyscome staceae* differs from *B. tenuiscapa* in having blackish (not brown or purplish-brown) cypselas. It differs from *B. foliosa* in having only 1 or 2 entire, linear leaves on the scape, not 3–16 entire or pinnatifid leaves; limited sampling suggests that the cypselas of this species are generally smaller, being 1.2–1.7 mm long compared to 1.5–2.4 mm long in *B. foliosa*.

The majority of specimens examined lack mature fruit and many are placed in this species on the basis of their leaf morphology and habit.

This species is generally uniform throughout its range in leaf morphology but exhibits variation in indumentum and pappus size. Normally the stalked glandular hairs that constitute the general indumentum

are variable in length on any plant but always less than c. 0.2 mm long. However, in a Bêche specimen from Bolivia (between Tenterfield and Glen Innes) collected in 1886 (MEL 49286) the hairs are commonly 0.5–0.8 mm long, and they are about 0.3 mm long and very dense in a specimen from Stanthorpe collected by Bailey (MEL 49289). There is also variation between specimens in the presence or absence of hairs on the corolla. The pappus is always minute and seemingly absent from some fruit.

*Selected specimens examined.*

QUEENSLAND: Palingyard Creek, NE of Wallangarra, 26 Sept. 1973, I.R. Telford 3175 (CBG).

NEW SOUTH WALES: Armidale, 19 Nov. 1941, G.L. Davis (AD, BRI 272388, HO 117514, MEL 49292, NSW, PERTH 391816); 4 miles N of Armidale, 24 Oct. 1955, G.L. Davis (AD 98669067); 3.5 km NW of Backwater, 30 Jan. 1993, P.S. Short 3975 (MEL).

**75. *Brachyscome tasmanica* P.S.Short, sp. nov.**

**Type:** Tasmania. South Arm Road at Sandford, sea level, 42°55'S, 147°30'E, 19 Nov. 1958, W.M. Curtis (**holotype:** HO 52207).

Perennial, rhizomatous herb 8–21 cm tall, base of plant with or without remains of old leaves, or usually few when present. *Leaves* mainly in basal tufts, linear or linear-oblongate, entire, 10–56 mm long, 0.25–3.7 mm wide, largest ones slightly dilated basally, glabrous or with a mostly sparse indumentum of white, coarse, uniseriate, septate eglandular hairs, particularly on margins and basally, stalked, biseriate glandular hairs rarely present basally. *Scapes* 1 or 2 per tuft, each with up to 6 or 7 leaves reducing in size along the scape and mostly in the lower ½; glabrous or with scattered to dense white, weakish septate hairs in the lower half. *Involute* c. 6–6.5 mm diam. *Bracts* c. 15–25, essentially in a single whorl, obovate to oblanceolate, 2.8–3.6 mm long, 0.7–1.2 mm wide, mainly green, mostly with distinctly scarious margins and apex, apex obtuse, sometimes very pale purple, midrib prominently sunken, entire bract glabrous or occasionally with few stalked glandular hairs basally, rarely with some uniseriate eglandular hairs. *Receptacle* convex to subconical, alveolate. *Ray florets* with corolla c. 7 mm or more long, c. 0.6 mm wide, white or perhaps mauve when fresh but may dry yellow; tubular part with few biseriate glandular hairs. *Disc florets* with corolla tube 2.3–2.7 mm long, 5-lobed, yellow, with scattered, biseriate glandular hairs 0.08–0.13 mm long. *Stamens* 5; anthers 1.2–1.28 mm long, microsporangia 0.98–1.03 mm long, each with a sterile apical appendage 0.22–0.25 mm long. *Style* 2.8–3.2 mm long, branches 0.55–0.65 mm long, sterile apical appendages shallowly subtriangular (apex somewhat obtuse) in outline, c. 0.13–0.2 mm long. *Cypselas* monomorphic, flat, obovate, 1.4–1.7 mm long, 0.6–0.85 mm wide, brown, concolorous, lateral surfaces smooth, entire fruit glabrous or with straight, whitish, eglandular hairs c. 0.05 mm long, ab/adaxial

ribs distinct in immature fruit but probably less so when fully developed; pericarp with 2 vascular bundles; carpodium present. *Pappus* a minute, pale yellowish, jagged crown to c. 0.15 mm high. *Chromosome number:* unknown. **Fig. 51.**

*Distribution.* Tasmanian endemic, being known from the south-eastern coast near Sandford and Tunbridge and probably from the vicinity of Strahan on the west coast.

*Habitat.* A coastal species whose habitat was simply recorded by W.M. Curtis (HO 52207) as being a “swamp, near sea level” but habitat notes recorded on A. Moscal 8739 (HO 402723) indicate that plants were growing in a lagoon on “high flood flats”, with *Isolepis platycarpa*, *Cotula coronopifolia*, *Plantago coronopus*, *Microtis* sp., *Selliera radicans*, *Angianthus preissianus* and *Limosella australis*.

*Notes.* This species differs from other members of this group with only entire leaves (*B. obovata* and *B. scapigera*) in having smaller cypselas (1.4–1.7 mm long, 0.6–0.85 mm wide vs 1.7–2.9 mm long, 0.9–1.6 mm wide) and mostly shorter and more narrow leaves (10–56 mm long, 0.25–3.7 mm wide vs 25–250 mm long, 1–14 mm wide).

Although the affinities of *B. tasmanica* appear to lie with others in this group the combination of smooth fruit which lack longitudinal ridges, wings and tubercles and the common presence of only entire leaves does suggest a possibility that it may be close to *B. parvula*. However, that species lacks well-developed terminal anther appendages.

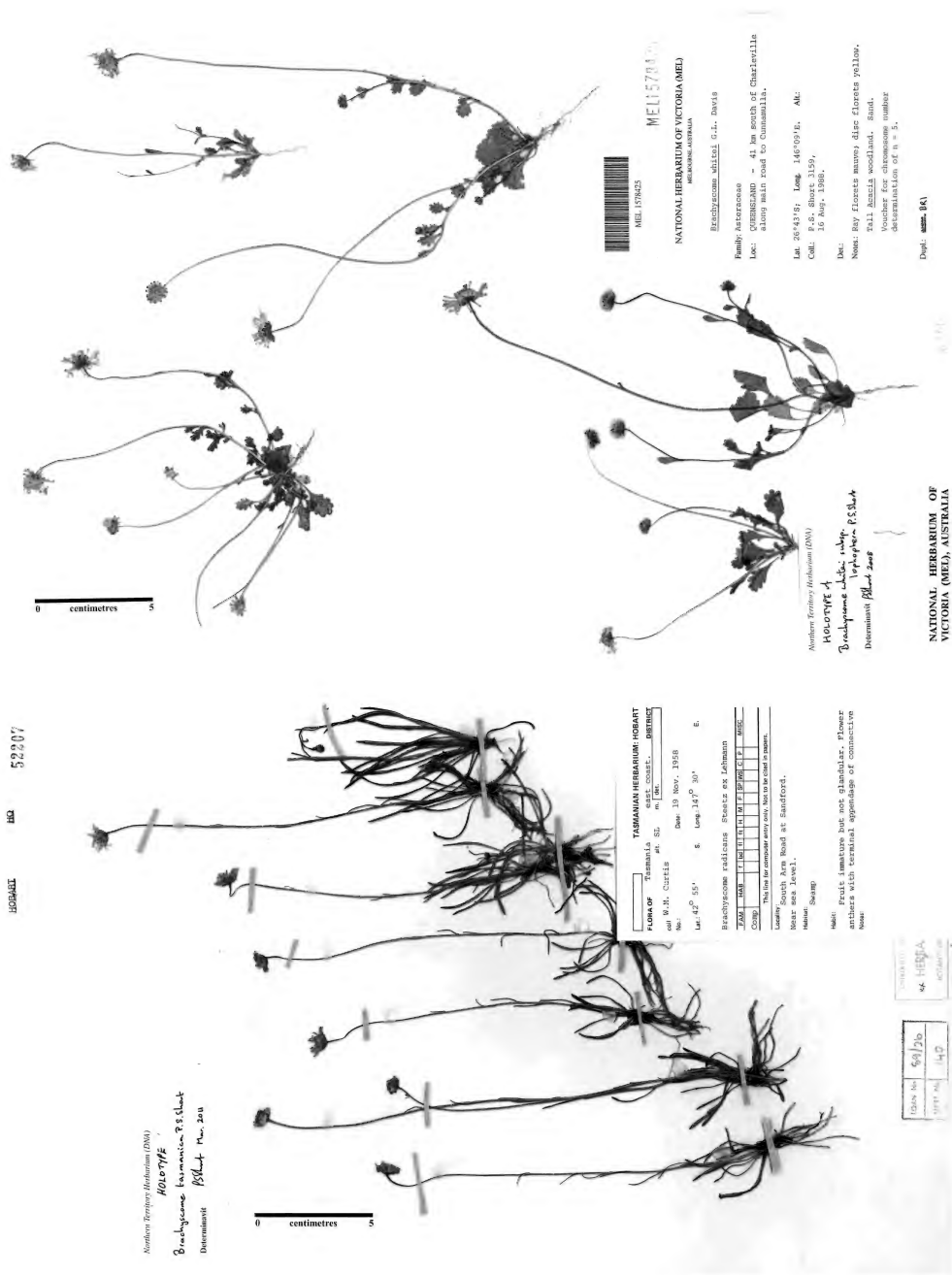
*Additional specimens examined.*

TASMANIA: near [presumably White] Lagoon, 7 Nov. 1984, A. Moscal 8739 (HO); Strahan, Dec. 1892, L. Rodway (HO 9802, HO 52227); White Lagoon near Tunbridge, 6 Nov. 1984, A. Moscal 8711 p.p. (MEL 714446 p.p., including *B. aculeata*).

**76. *Brachyscome tenuiscapa* Hook.f.**

Hooker's Lond. J. Bot. 6: 114 (1847) (“*Brachycome*”); J.D. Hooker, Fl. Tasman. 1: 184, pl. 48B (1856) (“*Brachycome*”). — *Brachyscome scapiformis* var. *tenuiscapa* (Hook.f.) Benth., Fl. Austral. 3: 517 (1867) (“*Brachycome*”). — *Brachyscome tenuiscapa* Hook.f. var. *tenuiscapa*: G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 152, Fig. 3 & 8, pl. vi, map 1 (1948) (“*Brachycome*”), p.p., Tas. only; W.M. Curtis, Stud. Fl. Tasman. 294 (1963) (“*Brachycome*”) p.p., Tas. only; E. Salkin et al., Austral. Brachyscomes 230 (1995), p.p., Tas. only. — **Type citation:** “Middlesex plains, Gunn.” **Holotype:** Middlesex Plains. Feb. 1837, R.C. Gunn 321 (K 000882222), see note below. **Possible isotype:** Insula Van Diemen, R. Gunn 321 (K 000882220), see note below.

Perennial, stoloniferous, scapose or scapiform herb. *Leaves* mainly in basal clusters, mostly oblanceolate or spatulate, scape leaves often somewhat linear, 7–35 mm long, 0.7–7 mm wide, entire or pinnatifid, with 3–7 (9) lobes in upper ½; leaf surfaces glabrous or with sparse stalked glandular hairs, particularly marginally; leaves basally not or slightly dilated, with or without





scarious margins. *Scapes* 1 per rosette, c. 5–20 cm long, 0.8–1.5 mm diam., with sparse to dense stalked glandular hairs throughout its length, commonly most dense near base of capitulum, hairs c. 0.1–0.3 mm long. *Receptacle* somewhat hemispherical, alveolate. *Involucre* c. 8–10 mm diam. *Bracts* c. 20, in more or less 1 row, of c. equal length, obovate, elliptic or ovate, 3.4–5.5 mm long, 0.9–2.2 mm wide, thinly herbaceous, with narrow, scarious, often purplish margins and apices, apices obtuse or nearly so, abaxial surface glabrous or with mostly scattered stalked glandular hairs, margins with or without scattered stalked glandular hairs. *Ray corolla* c. 10 mm long, white or tinged mauve. *Disc florets* 1.5–2.1 mm long (dried), 5-lobed, yellow. *Stamens* 5. *Style* appendages triangular, c. equalling stigmatic part. *Cypselas* somewhat flattened, obovate, 1.35–2.1 mm long, 0.8–1 mm wide, smooth, glabrous, ab/adaxial margins generally distinct body, cypselas brown or purplish brown except for carpodium; pericarp with 2 vascular bundles; carpodium annular, very narrow, whitish-brown. *Pappus* a short corona of teeth c. 0.1 mm long.

*Distribution.* Endemic to central Tasmania, ranging from the Cradle Mtn region in the north to Mt Field N.P. at the southern end of its range, and occurring in the Tasmanian Central Highlands (TCH) and Tasmanian Southern Ranges (TSR) bioregions (IBRA7 2012).

*Habitat.* A subalpine or alpine species recorded from *Poa*-dominated grasslands, herbfields, heathland and hummock shrubland. Associated species noted on herbarium labels include *Bossiaea riparia*, *Donatia novae-zelandiae*, *Epacris gunnii*, *Olearia algida*, *Pimelea pygmaea*, *Poa gunnii* and *Richea scoparia*.

*Phenology.* All flowering specimens seen were collected from November to late January.

*Cytology.* No data available.

*Typification.* Davis did not choose a lectotype, nominating a “haptotype” for comparison, this being a NSW sheet of *R.C. Gunn 321* gathered from Arthurs Lake and therefore not a syntype specimen. In *Flora Tasmaniae*, but not in the original description, Hooker specifically cited *R.C. Gunn 321*, the species number, not collectors number, used by Gunn for this taxon. At K there is but one sheet with specimens labelled as coming from Middlesex Plains; it includes illustrations of a bract, ray and disc floret, styles and an anther which are drawn directly on the sheet.. Two separate labels on the sheet record the same information, that is the locality of Middlesex Plains, the collector’s number and the date of collection, February 1837. One of these is attached in the bottom right hand corner. The other is a more elongate label stating “1837/321 ... *Brachyscome tenuiscapa*, n.sp./Collected at Middlesex Plains Feb’ 1837” and, as evidenced from a cibachrome, when I examined the specimen in 1991/92 it was pinned on the lefthand side of the sheet about halfway along the length; this label

partly obscured specimens and illustrations on the sheet and I assume that for this reason it was placed on the top right of the sheet when databased and photographed for electronic presentation. The same sheet also has another label with the species number 321 and the annotation that the plants were gathered from Arthurs Lake on 17 Jan. 1845; this label is placed immediately to the left of the bottom right label. There is some variation in the indumentum on the plants (with one small specimen seeming to be glabrous, another with hairs only below the capitulum but most with an indumentum of septate, glandular hairs) but I consider all individuals on the sheet to belong to the one taxon. Unfortunately, the labels and the plants are not clearly matched with each other and I believe it is only possible to say that the holotype specimen is on this sheet. However, from the JSTOR website it is evident that, during databasing, the Middlesex Plains elements have received the specimen number K 000882222, the elements comprising the Arthurs Lake specimen K 000882221, hence the citation above as the holotype specimen being K 000882222.

There is a further sheet at K (K 000882220) labelled as *R.C. Gunn 321* which was originally part of Herbarium Benthamianum and further, would appear to have been initially acquired by or from Lindley in 1838. The only locality is “Insula Van Diemen” and it is tentatively considered to be an isotype.

#### *Selected specimens examined.*

TASMANIA: Gowan Brae Road, N of Bronte Park, 24 Nov. 1985, *P. Collier 1041* (HO); Windy Moor, Mt Field NP, 25 Jan. 1983, *S.J. Forbes 1294* (MEL, NSW); Arthurs Lakes, 17 Jan. 1845, *R.C. Gunn 321* (K p.p., NSW); Middlesex Plains, 24 Nov. 1982, *A. Moscat 1032* (HO); Penstock Lagoon, 18 Jan. 1980, *J.J. Yates* (HO 32507).

### ***Brachyscome triloba* group**

*Brachyscome angustifolia* group: P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 841 (1999).

*Brachyscome linearifolia* group: P.S.Short, Muelleria 27: 3 (2009).

*Perennial*, rhizomatous herbs, often with fleshy and somewhat cylindrical roots. *Leaves* mostly obovate, toothed or lobed. *Terminal anther appendages* present. *Cypselas* monomorphic, laterally compressed, each lateral surface commonly tuberculate and with 2 longitudinal ridges internal to two vascular ribs (ab/adaxial margins), wings present or absent, eglandular biseriate hairs straight, curving throughout their length or apically curved to very slightly curled; pericarp with 2 vascular bundles; sclerenchymatous tissue mostly or only restricted to ab/adaxial margins but usually extending to the base of the longitudinal ridges; cells of the testa with evenly thickened margins. *Chromosome numbers*:  $n = 5, ?, 9, 18$ .

*Distribution.* Eastern mainland Australia.

*Notes.* This is a group of closely related taxa confined to eastern, mostly montane, mainland Australia



Fig. 53. *Brachyscome procumbens* subsp. *procumbens*, Mt Kaputar N.P. — P.S. Short 3951.

and recently revised (Short 2009). As noted in the revision this group is partly one based on historical circumscription as much as any morphological distinctiveness. Thus, ignoring the longitudinal ridges on the lateral surfaces of the cypselas, it is a group not far removed from other eastern Australian species such as *B. microcarpa*, *B. nova-anglica* and others I here refer to the *B. multifida* group and those in the *B. aculeata* complex.

Unfortunately, in the revision of this group I (Short 2009) chose to use the name *B. linearifolia*, having forgotten a comment by Burbidge (1982, p. 3) in her revision of *Vittadinia* that there is a specimen in P she believed to be “part of the original material of *Brachyscome triloba* Gaudich.” which “agrees closely with the figure for *Brachyscome angustifolia* A.Cunn. ex DC. var. *heterophylla* (Benth.) Davis [Davis 1948]”. Having since examined scans of this and another specimen I agree with her conclusion; they are of the same taxon and *B. triloba* is the correct name for it when treated as a species.

Subsequent to publication of Short (2009) I have examined cross-sections of fruit of five species in this group. Those species, with the voucher specimen in brackets, are *B. kaputarensis* (K.L. Solling 545), *B. sieberi* (I.R. Telford 3570), *B. formosa* (P.S. Short 3028), *B. petrophila* (J.H. Willis MEL 1580307) and *B. salkiniae* (S.J. Forbes 512). In all five species the cells of the testa are evenly and manifestly thickened while sclerenchymatous tissue is predominantly confined to the vicinity of the ab/adaxial ribs, with extension of the tissue to the base of the longitudinal ridges observed in all but *B. sieberi*.

The following taxa are recognised. For a full account, including a key to species and additional literature citations, see Short (2009).

#### 77. *Brachyscome brownii* P.S.Short

Muelleria 27: 4, Fig. 1 & 2 (2009). — **Holotype:** Pokolbin, Apr. 1906, R.H. Cambage (NSW 15175).

[*Brachyscome heterophylla* auct. non Benth. (1837): Benth., Fl. Austral. 3: 515 (1867) (“*Brachycome*”), p.p.]

[*Brachyscome angustifolia* var. *heterophylla* auct. non (Benth.) G.L.R.Davis: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 162 (1948) (“*Brachycome*”), p.p.]

#### 78. *Brachyscome formosa* P.S.Short

Muelleria 6: 390, Fig. 1 & 2 (1988); E.Salkin et al., Austral. Brachyscomes 112, illustration 113 (1995), excluding Entities 1 & 2. — **Holotype:** New South Wales. c. 3.5 km north-west of Coonabarabran, along road to Baradine. 31°14'S., 149°14'E. Open forest of *Eucalyptus* (White Gum, Stringybark and Box). Sparse shrub understorey of epacrid shrubs and *Daviesia latifolia*. Very sandy loam. 3 Oct. 1984, P.S. Short 2425 (MEL 1529338). **Isotypes:** AD, BRI, CANB, K, NSW.

*Brachyscome* “superspecies *basaltica*” species no. 5: Smith-White et al., Austral. J. Bot. 18: 103 (1970) (“*Brachycome*”).

*Brachyscome* species (Pilliga), “with affinity to *B. melanocarpa*”: R.Elliot & D.L.Jones, Encyc. Austral. pl. 2: 374 (1982).

*Brachyscome* ‘Pilliga Posy’, *Brachyscome formosa* ‘Pilliga Posy’ and *Brachyscome* ‘Tinker Bell’, nursery industry (see Short 1988).

[*Brachyscome angustifolia* var. *heterophylla* auct. non (Benth.) G.L.R.Davis: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 162 (1948) (“*Brachycome*”), p.p.]

#### 79. *Brachyscome kaputarensis* P.S.Short

Muelleria 27: 9, Fig. 4 & 5 (2009). — **Holotype:** New South Wales, Mt Kaputar N.P., Jokers Spring, in eucalypt forest below falls, 19 Nov. 1976, R. Coveny 8768 & S.K. Roy (NSW 229966). **Isotypes:** MEL 1589180, NSW.

*Brachyscome* sp. aff. *angustifolia*: K.Watan. et al. Muelleria 9: 200 (1996), as to P.S. Short 3944.

[*Brachyscome angustifolia* var. *heterophylla* auct. non (Benth.) G.L.R.Davis: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 162 (1948) (“*Brachycome*”), p.p.; J.Everett in G.J.Harden, Fl. New South Wales 3: 166 (1992), p.p.]

*Note.* For an illustration of a fruit see Fig. 7A.

#### 80. *Brachyscome mittagongensis* P.S.Short

Muelleria 27: 17, Fig. 2 & 7 (2009). — **Holotype:** New South Wales, between Marulan and Berrima, in roadside drain and partly cleared grazing land, alt. c. 680 m, 17 Mar. 1969, B. Briggs 3038 (NSW 228368).

*Brachyscome heterophylla* Benth. in Endl. et al., Enum. Pl. Huegel 60 (Apr. 1837) (“*Brachycome*”) p.p., the type specimen being a mixed colln of *B. heterophylla* and *B. mittagongensis*.

[*Brachyscome sieberi* auct. non DC.: Benth., Fl. Austral. 3: 520 (1867) (“*Brachycome*”) p.p.; C.Moore, Handb. Fl. New South Wales 264 (1893) (“*Brachycome*”).]

*Note.* Mounted on the same sheet as the holotype specimen of *B. triloba* (see below) there is another specimen, P 00731618. It consists of two branchlets and is of *B. mittagongensis*. It is labelled as having been collected by Gaudichaud from New Holland and bears, as Burbidge (1982) noted, the manuscript name “*Bellioides tridentata*”; the latter is not ascribed to an

author and is in obvious reference to the 3-toothed apex of the leaves.

### 81. *Brachyscome petrophila* G.L.R.Davis

Proc. Linn. Soc. New South Wales 74: 147, Fig. 6–7, (21 Oct. 1949) (“*Brachycome*”). — **Holotype**: Victoria, Little River Falls, about five miles NE of Wulgulmerang, on dripping cliff faces, 16 Jan. 1948, *J.H. Willis* (MEL 1580304 p.p., excluding isotypes). **Isotypes**: MEL 1580304 p.p. (excluding holotype), MEL 1580305, MEL 658089, NSW 15570.

*Note*. A partial transverse section of a fruit is shown in **Fig. 12C**.

### 82. *Brachyscome procumbens* G.L.R.Davis

Proc. Linn. Soc. New South Wales 73: 164, Fig. 18, 28, pl. vi, map 8 (1948) (“*Brachycome*”). **Holotype**: New South Wales, Blue Hole, near Armidale, rocky situations on steep slopes among boulders, 15 Apr. 1941, *Consett Davis* (NSW15198). **Isotypes**: BRI 331299, MEL 220630.

- Leaves with primary divisions only or mostly extending c.  $\frac{1}{4}$ – $\frac{1}{2}$  way to the midrib, if extending further then only so in the formation of the lower-formed primary lobes of a leaf or when the leaves mostly consist of 3 or 5 entire, primary lobes; secondary divisions absent or shallow and confined mostly so to the upper primary lobes (Fig. 53) . . . . . **82a. subsp. *procumbens***
- Leaves with most or all primary divisions extending to about the midrib; secondary leaf divisions present on all or most primary lobes and extending up to c.  $\frac{1}{2}$  the width of the primary lobe . . . . . **82b. subsp. *wombelongensis***

### 82a. subsp. *procumbens*

see *Muelleria* 27: 23–25, Fig. 9 (2009). **Fig. 7B, 53**.

### 82b. subsp. *wombelongensis* P.S.Short

*Muelleria* 27: 25, Fig. 2 & 10 (2009). — **Holotype**: New South Wales, Warrumbungle Range, Mt Wombelong, in rock crevasses [sic], 5 Dec. 1973, *H. Streimann* 538 (CBG 053899, held in CANB). **Isotypes**: A n.v., L n.v., NSW 224121.

*Note*. Subsequent to describing this taxon I became aware of another specimen, *R.H. Cambage* 1785 (NSW) which, apart from it being beset with denser long, white, septate, uniseriate, eglandular hairs than the holotype specimen, seems well-placed in this taxon, having similarly dissected leaves and, although they are immature, apparently identical winged fruit. It was collected in Oct. 1907 in the vicinity of Murrurundi, about 200 km south-east of the type locality.

### 83. *Brachyscome salkiniae* P.S.Short

*Muelleria* 27: 17, Fig. 2 & 7 (2009). — **Holotype**: Ivor’s Track, 7 km north-west of Genoa, 37°20’S, 149°25’ 30’E, in dry open forest 50 m from Genoa River, 8 Nov. 1983, *N.G. Walsh* 1214 (MEL 1523514). **Isotype**: CANB 349878.

*Brachyscome* aff. *formosa* Entity 1: E.Salkin et al. (1995), Austral. *Brachyscomes* 114, illustrations 115 (1995); P.S.Short in *N.G. Walsh & Entwisle*, Fl. Victoria 4: 841 (1999).

[*Brachyscome angustifolia* var. *heterophylla* auct. non (Benth.) G.L.R.Davis (1948): G.L.R.Davis, Proc. Linn. Soc. New South Wales 74: 149 (1949) (“*Brachycome*”)

p.p., as to Willis specimen: *J.H. Willis*, Handb. Pl. Victoria 2: 669, 674 (1973) (“*Brachycome*”).]

*Note*. For an illustration of a fruit see **Fig. 7C**.

### 84. *Brachyscome sieberi* DC.

Prodr. 5: 306 (1836) (“*Brachycome*”); Benth., Fl. Austral. 3: 520 (1867) (“*Brachycome*”) p.p.; P.S.Short, *Muelleria* 27: 28, Fig. 4 & 12 (2009). — **Lectotype**: Fl. New Holland, 1825, *Sieber* 485 (G-DC, mounted with *Gunn* 222 & *Gunn* 388 of *B. aculeata*). (Davis 1948, p. 186, pl. ix, no. 2, p.p.). **Isolectotypes**: E 00385647 (ex GL), HAL 110932 (per JSTOR), K 000882306, M 0029707 (per JSTOR), W (4 sheets).

[*Brachyscome angustifolia* var. *heterophylla* auct. non (Benth.) G.L.R.Davis: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 162 (1948) (“*Brachycome*”) p.p.; J.Everett in G.J.Harden, Fl. New South Wales 3: 166 (1992) (“*Brachycome*”) p.p.; E.Salkin et al., Austral. *Brachyscomes* 40–43 (1995), p.p., as to Barrington Tops specimens illustrated on p. 43.]

*Note*. In Short (2009), on the determinavit slip accompanying the scanned specimen which comprises Figure 12, I erroneously gave myself as the author of the name *B. sieberi*; it is of course DC. as otherwise used in both that paper and here.

There are specimens from Oberon Dam (*Smith-White* 21035–21040; three sheets) in SYD of this species. Smith-White et al. (1970) cited specimens from Oberon, not Oberon Dam, under their “Species No. 4” in the “superspecies *basaltica*” as having  $n = 9$ . Other than the above specimens I have no record of seeing any specimens from Oberon which could potentially qualify as being the vouchers for this determination. However, there are several reasons to indicate that these are not them. Apart from the discrepancy in the stated location, there is no annotation on any of the three sheets that any chromosome number was determined from them, and the determination of  $n = 9$  is at variance with that of  $n = 5$  reported for this species, as *B. sp. aff. angustifolia*, by Watanabe et al. (1996b).

### 85. *Brachyscome triloba* Gaudich.

in Freyc., Voy. Uranie 467 (6 March 1830) (“*Brachycome*”). — **Type citation**: “In Novae Hollandiae ora orientali (Port-Jack.)”. **Holotype**: Urairie/Port Jackson, undated, *C. Gaudichaud* (P 00691930, scan seen. **Isotype**: P 00731617, scan seen).

*Brachyscome linearifolia* DC., Prodr. 5: 306 (1–10 Oct. 1836) (“*Brachycome*”); P.S.Short, *Muelleria* 27: 13, Fig. 4 & 6 (2009). — **Type citation**: “in Nova Hollandia. Omnino refert figuram sinistram tab. 204. sp. fl. Nov. Holl. Labill. sed achaenia certè pappo prioribus simili coronata nec nuda. (v.s. comm. à cl. Lambert. et Thibaud.)”. **Lectotype**: Lambert (G-DC). (Davis 1948, p. 162, pl. 7, no. 2). **Remaining syntype**: Thibaud (G-DC).

*Brachyscome heterophylla* Benth. in Endl. et al., Enum. Pl. Huegel 60 (Apr. 1837) (“*Brachycome*”) — *Brachyscome linearifolia* var. *heterophylla* (Benth.) C.Moore, Handb. Fl. New South Wales 264 (1893) (“*Brachycome*”). — *Brachyscome angustifolia* var. *heterophylla* (Benth.) G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 162, Fig. 16 (1948) (“*Brachycome*”), p.p. — **Type citation**:

"Ferd. Bauer". **Lectotype:** *Brachyscome heterophylla* Benth./ Insula van Diemen/ ferd. Bauer, del 43 & 76 (W, excluding *B. mittagongensis*). (Short 2009, p. 13; supersedes lectotypification by Davis 1948, p. 162, Fig. 16). **Isolectotype:** K 000882204 (ex Herb. Mus. Vind. 1836), p.p., as to central element only, those on left and right of *B. mittagongensis*.

*Brachyscome oblongifolia* Benth. in Endl. et al., Enum. Pl. Huegel 60 (Apr. 1837), ("Brachyscome"). — **Type citation:** "Van Diemen's Land. [sic] (Ferd. Bauer.)." **Holotype:** W. Isotype: K 000882309.

[*Brachyscome angustifolia* auct. non A.Cunn. ex DC. var. *angustifolia*: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 161, Fig. 15, 26, pl. vi, map 7, pl. vii, 2 (1948) ("Brachyscome") p.p.; J.Everett in G.J.Harden, Fl. New South Wales 3: 166 (1992) ("Brachyscome"), not as to distribution; E.Salkin et al., Austral. Brachyscomes 38, illustration 39 (1995), not as to distribution.]

**Typification.** As noted above, Burbidge (1982) referred to a specimen in P she believed to be "original material of *Brachyscome triloba* Gaudich." That specimen (P 00731617) is labelled as coming from New Holland ("Nouv. Holl."), is attributed to Gaudichaud, and was acquired by P from Herb. Maire in about 1910 (O. Durbin, pers. comm. July 2011). I consider this to be an isotype specimen of the name *B. triloba* as there is yet another specimen, not seen by Burbidge, which should be considered to be the holotype. This specimen, P 00691930, consists of two leafy branches with what appear to be somewhat immature capitula and is named and labelled in Gaudichaud's hand. The locality, Port Jackson, is in accord with the protologue and Gaudichaud is known to have given all of his collections to P (Stafleu & Cowan 1976–1988).

**Note.** In Short (2009) I made reference to a specimen collected by W.F. Blakely (erroneously as W.H. Blakely) in 1914 (NSW 15168) in which it was noted that the species is grazed by livestock. Blakely was also perhaps the first to note the horticultural potential of this species, stating on the label that it is

A pretty little plant found in rather dry gravelly soil. Like other species it is well worth a trial at domestication, & perhaps would be suitable for hanging baskets. It is a hardy perennial & sheep & cattle browse upon it.

## 86. *Brachyscome willisii* P.S.Short

Muelleria 27: 31, Fig. 2 & 13 (2009).

*Brachyscome* aff. *formosa* Entity 2: E.Salkin et al., Austral. Brachyscomes 114, illustrations 116 (1995); P.S.Short in N.G.Walsh & Entwisle, Fl. Victoria 4: 841 (1999). — **Holotype:** Victoria, Mt Granya, 35 km east of Wodonga, mountain forest on S. slope of summit, 18 Nov. 1964, J.H. Willis (MEL 502478). **Isotypes:** CANB 467949, MEL 239735, NSW 229916.

[? *Brachyscome angustifolia* auct. non DC.: J.H.Willis, Handb. Pl. Victoria 2: 669 (1973) ("Brachyscome"), p.p.]

[*Brachyscome angustifolia* var. *heterophylla* auct. non (Benth.) G.L.R.Davis: J.Everett in G.J.Harden, Fl. New South Wales 3: 166 (1992) ("Brachyscome"), p.p.]

[*Brachyscome petrophila* auct. non G.L. Davis: J.H.Willis, Handb. Pl. Victoria 2: 671 (1973) ("Brachyscome"), p.p.]

**Note.** For an illustration of a fruit see Fig. 7D.

## *Brachyscome whitei* group

Annual herbs. Leaves basal and cauline, broad, lobed. Rays white or bluish. Terminal anther appendages present. Cypselas monomorphic, the body of the fruit with two longitudinal ridges running the length of the fruit and apically united; between each of the longitudinal ridges each lateral surface with a central elongate mound running about the length of the body, prominent ab/adaxial wings external to the lateral ridges, eglandular hairs apically-curved. Chromosome number:  $n = 5$ .

**Distribution.** New South Wales and Queensland.

**Notes.** The cypselas, with their elongate central mound on the lateral surface and a ring of sclerenchymatous tissue – possibly surrounding a large secretory canal at the base of the wing – make this a very distinctive taxon. It is for this reason that I have chosen to highlight it by placing it in its own group. However, I suspect it will be shown to have affinities with species such as *B. microcarpa* s.lat., which are here placed in the *B. multifida* group.

## 87. *Brachyscome whitei* G.L.R.Davis

Proc. Linn. Soc. New South Wales 73: 164, Fig. 19, 29, pl. vi, map 8 (1948) ("Brachyscome"); G.M.Cunningham et al., Pl. W. New South Wales 647 (1981) ("Brachyscome"); Stanley in Stanley & E.M.Ross, Fl. SE Queensl. 2: 509, Fig. 71D (1986); J.Everett in G.J.Harden, Fl. New South Wales 3: 167 (1992) ("Brachyscome"); E.Salkin et al., Austral. Brachyscomes 242 (1995). — **Type citation:** "Holotype: Bybera, between Inglewood and Milmerian, 5.9.1935, C. T. White, n. 10751 (BRI). Paratypes: Eight l.c. (BRI), one l.c. (NSW), one l.c. (MEL)." **Holotype:** BRI-AQ0370491. **Isotypes:** CANB 20596, K 000882202, K 000882203 (both specimens lacking fruit), MEL 220481, NSW 15203.

Annual herb, major axes ascending to erect, 5–30 cm long, mostly glabrous to manifestly hairy; shortly stalked glandular hairs less than c. 0.06 mm absent or present; long, white, biseriate, septate crooked, broad-based hairs 0.2–1.4 mm which taper towards minutely glandular apices and which when dense give a woolly appearance present or absent. Leaves basal and cauline, alternate but uppermost sometimes subopposite at branching points, glabrous or with short glandular hairs or with few to many biseriate, septate, whitish and terminally glandular hairs as on branches; basal and some lower-cauline to most cauline leaves with at least the lower ½ narrow and petiole-like for c. 5–40 mm, only dilated slightly at base, sometimes some lower-cauline and mid- to uppermost cauline leaves tapering downward but lower part generally not petiole-like, bases slightly dilated; basal and lower-cauline leaves spatulate, subspatulate or linear-oblongate in outline, 13–70 mm long, 5–20 mm wide, with 5–13 teeth or lobes, lobes mostly shallow, extending less than c. ½ of the way to the midrib, sometimes lowermost lobes extending almost to the midrib or rarely most lobes deeply cut (Williams 78240), occasionally each

major lobe with a smaller tooth, all resultant segments acute to obtuse, innocuously and minutely mucronate; mid and upper cauline leaves few to many, shorter and narrower than lower leaves, similarly lobed or more deeply cut; uppermost leaf often entire. *Peduncles* manifestly exceeding upper leaves, glabrous or with whitish, crooked, septate glandular hairs. *Involucre* 3.1–8 mm diam. *Bracts* 12–22 in or almost in a single row, usually of c. equal length but sometimes several manifestly shorter, all bracts elliptic to narrowly elliptic, ovate or obovate to oblanceolate, 2.3–6.4 mm long, 0.8–2.1 mm wide, thinly herbaceous, with hyaline margins and apices, obtuse to acute apices and upper margins purplish, bracts with stalked glandular hairs externally, 0.05–0.44 mm long, mostly in the lower  $\frac{1}{2}$ , bracts strongly reflexed after fruiting. *Receptacle* at maturity (with bracts reflexed) hemispherical, glabrous. *Ray florets* female, 21–56 per capitulum; corolla 6–9.8 mm long, c. 0.5–2 mm wide, recorded as white, blue, pale to dark mauve, mauve-blue, pink, pale violet, lavender and lilac, (2-) 4-veined, minutely c. 2-lobed apically. *Disc florets* bisexual, 44–127; corolla tube 1.35–2.4 mm long, with limb distinct, 5-lobed, yellow. *Stamens* 5; anthers 0.77–1.26 mm long, microsporangia 0.61–1.0 mm long, apical appendages 0.13–0.31 mm long. *Style* 1.4–1.9 mm long, arms 0.5–0.9 mm long, stigmatic part 0.31–0.42 mm long, apical appendage triangular in outline, 0.21–0.28 mm long. *Cypsela* monomorphic, very widely obovate to obovate or widely elliptic or subcircular in outline, 1.3–1.95 mm long, 1.05–1.95 mm wide, body of the fruit with two longitudinal ridges running its length and apically united, between each of the longitudinal ridges each of the lateral surfaces has an elongate mound which is beset with scattered eglandular hairs and runs about the length of the body; prominent ab/adaxial wings present and running the length of the fruit, with a distinct apical notch; wings with few grooves and mostly smooth, thin, sub-opaque or with c. 10–18 transverse ridges, individual ridges not manifestly distinct from each other, wing thick, base of each wing with a ring of sclerenchyma which possibly contains a large secretory canal, vascular tissue on the outer side (relative to the body) of the sclerenchyma; outer margins of all wings externally with apically-curved whitish eglandular hairs 0.08–0.28 mm long along their length; pericarp with two vascular bundles, one in each of the ab/adaxial margins at the base of the swollen part of the wings; testa cells with mostly u-shaped thickening, occasionally somewhat evenly thickened (P.S. Short 3159 & 3579, subsp. *lophoptera*); carpopodium annular, 0.04–0.08 mm or 3–5 cells wide, whitish, generally only visible when the cypselas is viewed end-on. *Pappus* a crown of unequal, whitish bristles 0.05–0.42 mm long. *Chromosome number*:  $n = 5$ . **Fig. 7E, F, 52, 54.**

*Distribution.* Central and north-eastern New South Wales and much of Queensland below 20°S and west of 144°E, encompassing arid to temperate localities.

A specimen attributed by Davis (1948) to *B. whitei* (MEL 220483) and stated on the label to have been collected on 29 June 1861 during the Victorian Expedition is of a single plant in poor condition. It may or may not be of *B. whitei*. The fragment bag which forms part of the specimen contains two non-fruiting capitula – presumably both from the damaged plant attached to the sheet – and some mature fruit. One fruit is from a member of the *B. diversifolia* complex while the remainder are of *B. whitei* subsp. *lophoptera*. Members of the Victorian Expedition were at Lake Pamamaroo on 29 June, a location well-outside the otherwise known range of this species. I have therefore concluded that either the fruit of *B. whitei* are from another collection or that the label is erroneous.

*Reproductive biology.* Pollen:ovule ratios in excess of 2,000 and indicative of a high degree of outcrossing have been determined for both subspecies. For details see under subspecies.

Presumably for subsp. *lophoptera*, Salkin et al. (1995) recorded that germination takes 1–6 months and that percentage germination is low.

*Cytology.* Chromosome number determinations of  $n = 5$  and  $2n = 10$  are recorded, all coming from specimens here referred to subsp. *lophoptera*. For more details see under that taxon.

*Type specimens.* Davis indicated that there were eight paratype specimens, i.e. individual plants, at BRI in addition to the holotype. However, no such duplicates were received on loan from BRI, but two specimens, each consisting of a single plant mounted on a sheet, are held at K, and another specimen (again a single plant) is at CANB. All three specimens are identically labelled with a Queensland Herbarium label and I assume they were distributed subsequent to Davis's publication.

The holotype and isotypes of *B. whitei* are poor; no individual plants have completely mature fruit and immature fruit of the two subspecies recognised are not dissimilar, with ridges and thickening of the wings not always apparent until near-maturity. However, both the sparse indumentum of the plants and White's earlier collection from Bybera, which has more mature fruit, leaves no doubt as to the application of the name.

*Notes.* Davis, when describing *B. whitei*, recorded that the species has fruit with "relatively broad, thin" wings and, in discussing variation in the species, recorded that a specimen from Adavale has fruit with "wings ... thrown into transverse folds". However, she considered it to be "otherwise identical with those of the rest of the series". Similarly, she noted considerable variation in the indumentum of specimens, with those from Bybera (which includes the type of *B. whitei*) having an indumentum of mostly shortly staked glandular hairs, while others examined were "macroscopically woolly". Indeed, the taxon is extremely variable in regard to the indumentum (the size, structure and distribution

of hairs), to some extent the leaf shape and degree of division, and there is also variation in fruit colouration, with fruit usually maturing to a dark brownish-black or black but others having seemingly mature fruit which are pale brown. As with Davis I have opted to treat it as one variable species. However, there appears to be a clear-cut distinction in fruit morphology between specimens, i.e. specimens with a thick, ridged wing as opposed to the comparatively thin wing of *B. whitei* s.str., a feature which tends to be correlated with differences in indumentum. Thus, I here recognise two infraspecific taxa, subsp. *whitei* and subspecies *lophoptera*.

#### Key to subspecies of *B. whitei*

1. Cypsela wings thin, if ridges (transverse folds) present then not extending to the margins of the wing; plants mostly appearing glabrous, shortly-stalked glandular hairs may be present and common on young shoots but long, biserial, septate tapering glandular hairs seemingly absent (Fig. 7F) ..... **87a. subsp. *whitei***
- 1: Cypsela wings thick and with distinct ridges (transverse folds) extending to the margins; plants usually with numerous whitish, biserial, septate, crooked, broad-based hairs 0.2–1.4 mm long on at least some parts, rarely some plants almost glabrous (Fig. 7E, 52, 54) ..... **87b. subsp. *lophoptera***

#### **87a. *Brachyscome whitei* subsp. *whitei***

*Stem* and branches mostly glabrous, but shortly stalked glandular hairs less than c. 0.06 mm long may be present beneath the capitulum and on the bracts, and may form a dense indumentum on young shoots; longer septate, biserial hairs with small glandular apices seemingly absent. *Cypselas* widely elliptic or subcircular, 1.3–1.9 mm long, 1.2–2 mm wide; wings not manifestly thickened, as measured from the outer edge of the longitudinal ridges c. 0.54–0.56 mm wide, innermost part of wings smooth, c. 0.04–0.06 mm wide, mid part with c. 8 grooves formed along the length but these not extending to the opaque outermost part of the wing; margins of wings entire or minutely toothed, with eglandular, apically-curved hairs 0.08–0.14 mm long along their length; fruit body yellowish brown to a very dark brown-black or dark purplish-black. **Fig. 7F.**

*Distribution.* South-eastern Queensland and north-eastern New South Wales.

*Habitat.* Open forest on sandy soils, with associated species including *Allocasuarina luehmannii*, *Casuarina cristata*, *Callitris glaucophylla*, *Calytrix* sp., *Eucalyptus crebra*, *Melichrus urceolatus* and *Petalostigma pubescens*.

*Phenology & reproductive biology.* Flowering has been recorded in February, August and September. An estimated pollen:ovule ratio of 3,011 was recorded for a capitulum from *A.R. Bean 9934*, with 36 ray and 64 disc florets.

*Notes.* Two specimens (*N.T. Burbidge 5468* and *H.M.R. Rupp ?8*) listed below as being of this species lack fruit but are referred to it by virtue of their indumentum



**Fig. 54. *Brachyscome whitei* subsp. *lophoptera***, near Charleville, Qld. — *P.S. Short 3598*.

of only short glandular hairs and leaf shape and habit being consistent with specimens of subsp. *whitei*. Their placement in this subspecies is also consistent with the distribution of the other specimens of subsp. *whitei*.

#### *Additional specimens examined.*

QUEENSLAND: Milmerran–Goondiwindi road, 37.1 km from Milmerran, 22 Feb. 1996, *A.R. Bean 9934* (MEL); 76 miles SW of Dalby, on Moone Highway, 4 Sept. 1956, *N.T. Burbidge 5468* (CANB); Bybera, 3 Sept. 1934, *C.T. White* (BRI 331270).

NEW SOUTH WALES: Bruxner Hwy, 15.1 km NW of Yetman, 23 Aug. 1987, *R.G. Coveny 12684* (NSW); Warialda, Sept. 1905, *H.M.R. Rupp ?8* (NSW 15205).

#### **87b. *Brachyscome whitei***

##### **subsp. *lophoptera* P.S. Short, subsp. nov.**

**Type:** Queensland. 41 km S of Charleville, 26°43'S, 146°09'E. Tall Acacia woodland, sand. 16 Aug. 1988, *P.S. Short 3159* (**holotype:** MEL 1578425; **isotype:** BRI).

*Stem* and branches in part glabrous but almost always with some long, white, biserial, septate crooked, broad-based hairs 0.2–1.4 mm long, which taper towards minutely glandular apices; similar hairs usually on leaves and bracts. *Cypselas* very widely obovate to obovate, 1.3–1.95 mm long, 1.05–1.8 mm wide; wings thick, as measured from the outer edge of the longitudinal ridges 0.34–0.66 mm wide, innermost part of wings smooth, 0.04–0.18 mm wide, outer part 0.16–0.52 mm wide, with c. 10–18 transverse ridges, individual ridges not too manifestly distinct from each other, extending to margin; margins of wings with apically-curved, eglandular biserial hairs 0.1–0.28 mm long along their length; fruit body shades of brown to a very dark brown-black or black. **Fig. 7E, 52, 54.**

*Distribution.* Arid and semiarid parts of central-northern New South Wales and in Queensland south of 20°S and west of 144°E.

**Habitat.** Found in open shrubland or woodland on sand or sandy loams. Recorded dominant trees and shrubs include *Acacia aneura*, *A. harpophylla*, *Callitris glaucophylla*, *Eremophila gilesii*, *Eucalyptus crebra*, *E. populifolia* and a species of *Melaleuca*, while associated grasses include *Chloris pectinata*, *Eragrostis lacunaria*, *Paspalidium constrictum* and *Sporobolus caroli*.

**Reproductive biology.** Pollen:ovule ratios ranging from 2,149 to 5,698 were determined for 29 capitula sourced from four different populations (P.S. Short 3159, 3167, 3581, 3561).

**Cytology.** Chromosome number determinations of  $n = 5$  and  $2n = 10$  for this subspecies (all as *B. whitei*) have been recorded for many populations in Queensland (in the vicinity of Barcaldine, Charleville, Cunnamulla and Wyandra) and from Bourke and Enngonia in New South Wales (Smith-White et al. 1970, Fig. 4 & 19; Watanabe & Short 1992). Watanabe et al. (1996a, Fig. 30) and Watanabe et al. (1999, Fig. 61) presented an idiogram of somatic metaphase chromosomes of this taxon under the name *B. whitei*.

**Etymology.** The subspecific name *lophoptera* is derived from the Greek words, *lopho-*, ridge, and *pterus* (adj. A), winged, in reference to the thick, ridged wings of the fruit.

**Notes.** Transverse sections of fruit of subsp. *whitei* were not made. Sections of fruit of subsp. *lophoptera* revealed that internally the inner smooth portion of each of the wings consists of a ring of sclerenchymatous tissue surrounding a hole, which, if not a large secretory canal is an artefact of the sectioning process.

#### *Selected specimens examined.*

QUEENSLAND: 23 km N of Cunnamulla, 6 Sept. 1956, N.T. Burbidge 5491 (BRI, CANB); c. 1 km S of Wyandra, 16 Aug. 1989, P.S. Short 3581 & K. Watanabe (BRI, MEL, TNS); 43 km N of Charleville, 17 Aug. 1989, P.S. Short 3596 & K. Watanabe (BRI, MEL, TNS).

NEW SOUTH WALES: 34 km S of Bourke, 17 Aug. 1988, P.S. Short 3167 (MEL).

### ***Hullsia* P.S.Short**

Muelleria 20: 58, Fig. 2 (2004). — **Type:** *Hullsia argillicola* P.S.Short

Perennial herb, subsucculent, with a well-developed tap root, possibly suckering. *Stem* and branches ascending to erect, hollow, striated, glabrous, somewhat glaucous. *Leaves* alternate, sessile, entire, somewhat glaucous and succulent, with a prominent mid-vein and two prominent lateral mid-veins extending from the base. *Capitula* solitary, heterogamous, radiate. *Bracts* multiseriate, in rows of unequal length; stereome divided, basally with a single main vein, becoming cartilaginous; margins narrowly hyaline; entire bracts glabrous or with scattered, minute, glandular hairs on margins, bracts strongly reflexed after fruiting. *Receptacle* flat but becoming concave when bracts

reflex, epaleate. *Ray florets* female, several seriate. *Disc florets* male. *Disc corolla* yellow; tube with a distinct limb, with biseriate hairs externally; lobes 5. *Stamens* 5; anthers ecaudate, shortly calcarate, each with a sterile apical appendage; endothecial tissue radially thickened; apical appendage more or less triangular, cells with radial thickening; filament collar more or less straight in outline. *Style* shortly bilobed apically. *Cypselas* monomorphic, laterally flattened, obovate, glabrous, smooth but slightly viscid, brown; pericarp with 2 vascular bundles, sclerenchyma restricted to vascular bundles; testa cells with prominent u-shaped thickening (I. Wardell-Johnson 23); carpodium annular. *Pappus* absent. *Chromosome number:* unknown.

**Distribution.** Monotypic genus confined to northern Australia, with all but one collection from the Northern Territory (between 17° and 21°S), the remaining collection from Kununurra, Western Australia.

**Notes.** *Hullsia argillicola* is distinguished from all members of *Brachyscome* s.lat. by the possession of male, not bisexual, disc florets, and from most species by the multiseriate involucre of bracts, the bracts being manifestly of different lengths, not of equal length. The combination of entire leaves and erect habit are features which suggest affinities with *B. basaltica*. It not only differs from that species in the above characters of the disc florets and bracts but also in cypselas morphology; in *B. basaltica* they are tuberculate and have biseriate curved hairs.

The possession of male disc florets suggests affinities with genera such as *Calotis* R.Br., *Lagenophora* Cass., *Minuria* DC. and *Solenogyne* Cass., but this similarity is superficial. It is readily distinguished from *Calotis* which, along with *Erodiophyllum* F.Muell. and perhaps *Achnophora* F.Muell. and *Ceratogyne* Turcz., seem to form a discrete group within the Australian Astereae that is characterised by having fruit with pericarpic appendages. Such appendages superficially look like, and are usually, but erroneously, described as pappus elements. Affinities with species currently included in *Minuria*, undoubtedly not monophyletic, seem to be remote. All species in *Minuria* s.lat. are characterised by the possession of pappus bristles and have different fruit morphologies. Affinities with *Lagenophora* and *Solenogyne*, in which the species are stoloniferous scapose or scapiform herbs, also seem remote.

Hind, in Brummitt (2009), queried whether the name *Hullsia* should be regarded as a later homonym of *Hulsea* Torrey & A.Gray, an American genus also belonging to the Asteraceae. Citing “their non-overlapping distributions and the rather obviously different spellings” the Committee for Vascular Plants voted 2 to 16 “that the names should not be treated as homonyms.”

### **1. *Hullsia argillicola* P.S.Short**

Muelleria 20: 58, Fig. 2 (2004). — **Holotype:** Alexandria Station, 1 km SW of No. 16 Bore, 19 July 2000, J. Risler



445 & R.A. Kerrigan (DNA-D0142120) **Isotypes:** AD, BRI-AQ0849262, CANB, K, MEL 2352284, MO, NSW, PERTH, S.

**Habitat.** The species is confined to heavy clay soils in seasonally inundated regions. For a detailed description see Short (2004).

**Notes.** The species has a well-developed tap root and, although some plants seen by me are relatively small, there is no doubt that *H. argillicola* is a perennial.

### ***Pembertonia* P.S.Short**

Muelleria 20: 62, Fig. 3 (2004). — **Type:** *P. latisquamea* (F.Muell.) P.S.Short.

*Brachyscome* sect. *Heteropholis* F.Muell., Fragm. 11: 16 (1878), nom. inval.

**Perennial**, sprawling or scandent, glabrous shrub. *Leaves* alternate, entire, commonly linear, linear-oblongate or linear-elliptic but often somewhat curved, green, slightly succulent. *Capitula* solitary, radiate, heterogamous; involucre bracts in 2 rows, overlapping, herbaceous, outer c. 5 bracts markedly convex, shorter than those of the inner row, inner bracts flat to convex, all bracts glabrous, with c. 4–8 veins from base. *Receptacle* convex, naked, glabrous. *Ray florets* female; corolla usually white or pink, rarely somewhat mauve or purplish; tubular part with biseriate glandular hairs; ray with 4–9 veins, with 2 or 3 indistinct lobes. *Disc florets* numerous, bisexual, 5-lobed, yellow, externally with scattered biseriate glandular hairs. *Stamens* 5; anthers not tailed, connective not or barely exceeding microsporangium; endothelial tissue with radial thickening; filament collar straight in outline, basally not thicker than the filament. *Style arms* conspicuous, more or less oblong. *Cypselas* monomorphic, laterally compressed, thin, symmetrical or slightly asymmetrical but essentially obovate in outline, pale brown, wing-like margins and fruit body sometimes slightly discoloured; apically notched; basally with a region of smaller cells concolorous with the rest of the fruit; pericarp with several vascular bundles in each of the wing-like extensions, secretory canals absent; testa cells with u-shaped thickening (*P.S. Short* 2054). *Pappus* an uneven rim c. 0.1 mm high. *Chromosome number:*  $n = 9$ .

**Distribution.** A monotypic genus confined to Western Australia.

**Notes.** The cypselas morphology alone distinguishes this species – and this genus – from all others previously included in *Brachyscome* s.lat., and indeed from other members of the Australian Astereae. No other species has large, flattened, glabrous fruit with multiple vascular strands in the pericarp.

### **1. *Pembertonia latisquamea* (F.Muell.) P.S.Short**

Muelleria 20: 64, Fig. 3 (2004). — *Brachyscome latisquamea* F.Muell., Fragm. 11: 16 (Mar. 1878) (“*Brachycome*”); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 228, Fig. 110, 120, pl. vi, map 31 (1948) (“*Brachycome*”);

E.Salkin et al., Austral. Brachyscomes 134 (1995). — **Lectotype:** Shark Bay, [Oct. or Nov. 1877], *F. Mueller* (MEL 239618, p.p.). (Davis 1948, p. 228, Fig. 110). **Isotype:** MEL 239618 p.p., excluding lectotype. **Remaining syntype:** Champion Bay, *Charles Gray* 67 (MEL 239619).

For a full description of the species see Short (2004). An illustration of a partial transverse section of a fruit is shown in **Fig. 12D**.

**Cytology.** Idiograms of somatic metaphase chromosomes were published by Watanabe et al. (1996a, Fig. 10) and Watanabe et al. (1999, Fig. 19).

### ***Roebuckia* P.S.Short, gen. nov.**

**Type:** *Roebuckia halophila* (P.S.Short) P.S.Short

Annual *herbs*, glabrous or with septate eglandular and stalked glandular hairs. *Leaves* basal and cauline, alternate but the lowermost often (possibly always) opposite; first-formed leaves entire, uppermost leaves also often entire, but most leaves 1- or sometimes 2-pinnatisect, glabrous or with a sparse to dense indumentum of septate, uniseriate, eglandular hairs and stalked glandular hairs as on branches. *Bracts* in essentially 1 row, overlapping; stereome mainly herbaceous and inconspicuously fenestrated, margins and apices hyaline, outer surface glabrous or hairy. *Receptacle* somewhat hemispherical to conical, pitted, often with slightly raised pit margins, glabrous or occasionally with remnant hairs from the basal part of fruits. *Ray florets* with large corolla, limb commonly with 4 basal veins but often branching above base, sometimes to 8-veined; apex rounded, not or only minutely 2–4-lobed, sometimes shades of pink, otherwise white or shades of blue/purple. *Disc florets* tubular, with a distinct basal tube below the limb, yellow. *Stamens* 5; anther connective not or barely exceeding microsporangium; endothelial tissue with radial thickening; filament collar straight in outline, basally not thicker than filament. *Style arms* commonly with appendages somewhat oblong but may be lanceolate to obovate. *Cypselas* monomorphic or somewhat inconsistently dimorphic, at maturity often somewhat interlocking, straight (not curved through the longitudinal axis), only or usually with 2 definite lateral surfaces, rarely 3- or 4-faced, each lateral surface with two longitudinal ridges running the length of the fruit and joined at apex (and therefore u-shaped), ridges variably swollen, often only manifestly so at apex where they may form prominent shoulders or horns which are either glabrous or with apical tufts of eglandular hairs, gap on lateral surface between longitudinal ridges usually wide, sometimes narrow (as in *R. cheilocarpa* var. *quobbensis* and *R. halophila*) or obsolete at maturity; lateral gap tuberculate or smooth, with few to many hairs, bases of hairs always attached within the gap but tips of longest hairs may reach or exceed the apical shoulders; ab/adaxial margins entire or tuberculate, with or without eglandular hairs; eglandular hairs always

biseriate, usually apically incoiled (but straight in *R. cuneata*); pericarp with a prominent secretory canal in both the abaxial and adaxial margins, more canals in 3- or 4-faced fruit; basally often with a whitish peg-like pedicel, carpododium often present, annular, but sometimes indistinct and possibly absent. *Pappus* absent or crown-like, composed of short, basally-fused, bristle-like elements. *Chromosome number*:  $x = 9$ .

*Distribution*. With the exception of specimens of *R. similis*, which occurs in Western Australia, Queensland and New South Wales, all species are confined to semiarid and arid regions of Western Australia.

*Etymology*. William Dampier, sailing in the *Roebuck*, entered the waters of Shark Bay on 6 August 1699 and during a stay of five or six days became the first Englishman to collect Australian plants. He also collected further along the coast but of the 25 specimens now housed in the Sherardian Herbarium, Oxford, most were from Shark Bay (George 1971, Marner 1999, 2004) and, of these, one is a daisy which has been attributed to *Brachyscome* s.lat. and, as suggested by its large ray florets, belongs to this distinctive group of species. With this history in mind, and with the name *Dampiera* already taken, I have named the genus after the *Roebuck*.

I have not examined the Dampier specimen but, as indicated, have little doubt that it belongs to this group. However, I doubt very much that it is *Brachyscome ciliocarpa* W.Fitzg. (i.e. *Roebuckia ciliocarpa*), as suggested by George (1971); following my advice he (George 1999) subsequently referred to it as *Brachyscome* aff. *cheilocarpa*. As is noted under that species, specimens from Dirk Hartog Island are representative of two different entities of uncertain status.

*Notes*. Cypselas normally have two very definite lateral surfaces, each bordered by two longitudinal, apically joined ridges as described above. However, on occasions there are two additional ridges which leave the fruit being somewhat trigonous – or three-faced – rather than somewhat laterally flattened. Such fruit are reasonably common in some specimens of *R. similis* but are otherwise unusual. As well as having an additional face there is also an additional vascular bundle and secretory canal.

All species share the apparently unique feature of having large secretory canals in the pericarp. Other shared features include mostly subconical to conical receptacles, large ray corollas, often somewhat oblong style appendages in the bisexual disc florets, an absence of terminal anther appendages, cypselas with apically joined and barely to manifestly swollen longitudinal

### Key to species of *Roebuckia*

1. Apically swollen shoulders or horns of cypselas with at least a few hairs
  2. Ab/adaxial margins with prominent tubercles; pappus absent, but a small abscission zone from the corolla may be evident (Fig. 8I, J, 12H) ..... **5. *R. halophila***
  - 2: Ab/adaxial margins of cypselas smooth except for a few hairs and their minute bases; pappus present, crown-like, c. 0.4–0.7 mm long (Fig. 8K, L, 61–63) ..... **6. *R. lathamensis***
- 1: Apically swollen shoulders or horns of cypselas glabrous – note that hairs extending from lateral gap (cleft) may overlap shoulders
  3. Gap on lateral surfaces of cypselas with tubercles or at least some cypselas in a capitulum with at least part of the ab/adaxial margins dissected or with prominent tubercles (Fig. 8A–C, 12E, F, 55–57) ..... **1. *R. cheilocarpa***
  - 3: Gap on lateral surfaces and the ab/ad margins of cypselas lacking tubercles, the ab/adaxial margins essentially entire (minor swellings at base of hairs may be present)
    4. Eglandular hairs on cypselas apically straight (Fig. 60) ..... **4. *R. cuneata***
    - 4: Eglandular hairs on cypselas apically curling
      5. Apex of lateral surfaces of cypselas with a prominent horn-like extension
        6. Pappus minute and crown-like, individual elements 0.08–0.28 mm long; lateral gap of cypselas with a few scattered hairs; ab/adaxial margins of cypselas with hairs along their length (Fig. 8E, F, 58) ..... **2. *R. chinnockii***
        - 6: Pappus crown-like, 0.5–1 mm long; lateral gap of cypselas with a prominent cover of hairs; ab/adaxial margins of cypselas glabrous or only with 1–several basal hairs (Fig. 8O, P, 64) ..... **7. *R. nerrenensis***
      - 5: Apex of lateral surfaces of cypselas rounded and variably swollen
        7. Lateral surfaces of cypselas with scattered eglandular hairs which may be appressed to somewhat spreading and neither they nor any hairs on the ab/adaxial margin overlapping with the pappus or cypselas glabrous; leaves and stems commonly with a prominent indumentum of stalked glandular hairs or plants glabrous or almost so (Fig. 8N, 65) ..... **9. *R. similis***
        - 7: Lateral surfaces of cypselas with a prominent cover of somewhat appressed hairs obscuring most of the gap; the apices of the upper hairs in the lateral gap and/or those on the apices of the ab/adaxial margins distinctly overlapping with the pappus; leaves and stems mostly glabrous, eglandular septate hairs usually about the base of leaves but stalked glandular hairs few or absent
          8. Eglandular hairs on cypselas 0.25–1.8 mm long, those on the lateral surfaces and (when present) those on the upper ab/adaxial margins of the cypselas usually manifestly overlapping with pappus bristles; bracts apically subobtusate (Fig. 8G, H, 12G, 59) ..... **3. *R. ciliocarpa***
          - 8: Eglandular hairs on cypselas c. 0.8 mm long, those on the lateral surfaces usually not or barely reaching apex of the shoulder, only those hairs on the upper ab/adaxial margins about level with the pappus; bracts apically obtuse to somewhat acute (Fig. 8M) ..... **8. *R. oncocarpa***

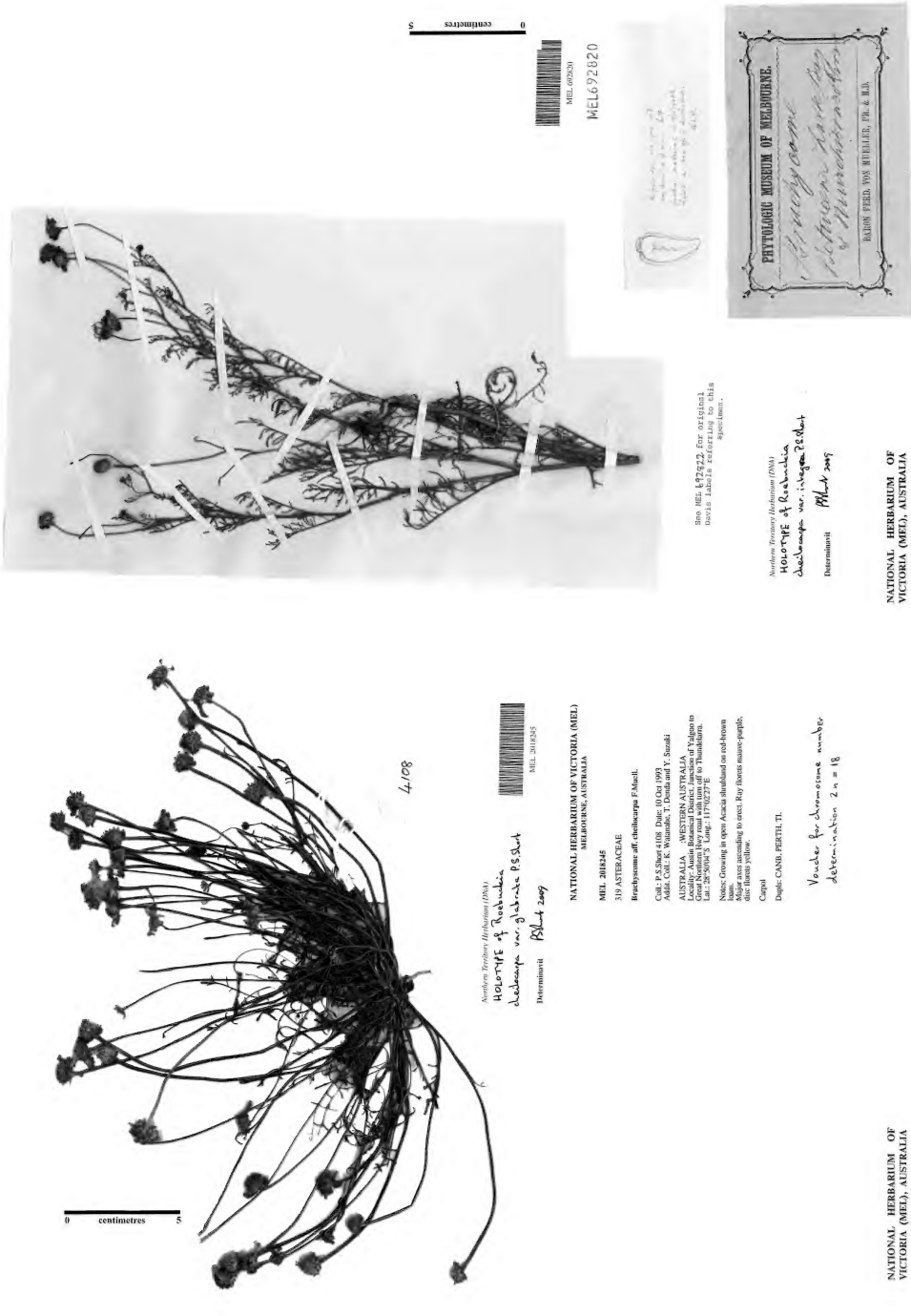


Fig. 55. Holotype of *Roebuckia cheilocarpa* var. *glabrata* (MEL), P.S. Short 4108.

Fig. 56. Holotype of *Roebuckia cheilocarpa* var. *integra* (MEL 692820), F. Mueller.

ridges on their lateral surfaces, cypselas which tend to interlock, and a base chromosome number of  $x = 9$ .

Davis (1948) placed members of this genus in their own group, the informal “superspecies *ciliocarpa*”, it in turn within the illegitimate subgenus *Metabrachyscome*, a subgenus characterised by the component species lacking a terminal anther appendage. In her brief discussion of relationships within the subgenus *Metabrachyscome*, she indicated that *B. iberidifolia* (referred by Davis to her “superspecies *iberidifolia*” and by me to the *B. iberidifolia* group) was the “primitive species in this subgenus” and that it gave rise to *Brachyscome ciliocarpa* and other members of “superspecies *ciliocarpa*”. She noted that

the general shape of the fruit of *B. ciliocarpa* is similar to that of *B. iberidifolia*, though considerably larger, and long apically rolled hairs are present marginally and on each lateral face

Davis (1948), p. 238

There is also a vegetative resemblance between members of both groups of species and, because of this, mixed collections of species are not unusual.

Unpublished cladistic analyses using morphological and anatomical characters suggested that *Roebuckia* may have close affinities with the *Brachyscome lineariloba* group, a group in which species differ inter alia from those of *Roebuckia* in having anther appendages and low haploid chromosome numbers (not  $x = 9$ ) but are similar in having large brownish cypselas with swollen lateral surfaces and often poorly formed carpodia, and also in having pinnatisect leaves with linear leaf segments. Because of the swollen longitudinal ridges of the cypselas, *Roebuckia*, the *B. lineariloba* group, and the *Brachystephium* group all grouped as a major clade, within which each was a distinct clade in its own right.

**1. *Roebuckia cheilocarpa* (F.Muell.) P.S.Short, comb. nov.**

*Brachyscome cheilocarpa* F.Muell., S. Sci. Rec. 2: 172 (1882) (“*Brachyscome*”); G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 228 (1948) (“*Brachyscome*”); Grieve & Blackall, How Know. W. Austral. Wildfl. 804 (1975) (“*Brachyscome*”); E.Salkin et al., Austral. Brachyscomes 64 (1995), presumably excluding Onslow specimen. — **Type citation:** “Near the Gascoyne-River, J. Forrest, Esq., F.L.S., F.R.G.S.” **Lectotype:** Gascoyne River, W.A., J. Forrest (MEL 2035074 p.p.). (Davis 1948, p. 228, Fig. 109). **Isolectotype:** MEL 2035074 p.p. **Probable isolectotypes:** Gascoyne River, 1882, J. Forrest (K 000882318, “recd 8/83”, MEL 2035075, MEL 2035076), see notes below.

Annual herb branching at basal and upper nodes; major axes ascending to erect, c. 5–35 cm long, with a sparse to prominent cover of white septate hairs to c. 1 mm long, sometimes some shortly stalked glandular hairs also present, upper part of axes glabrous. Leaves basal and cauline, all c. 10–100 mm long, not or slightly succulent, often much of surface glabrous but also with conspicuous whitish, septate, twisting, eglandular hairs c. 0.3–1 mm long present, hairs may be particularly

dense on young leaves, much smaller stalked glandular hairs may be present, commonly absent; first-formed leaves and uppermost leaves may be linear, most leaves usually 1-pinnatisect (rarely these primary lobes toothed or the leaves 2-pinnatisect as is common in var. *integra*); lateral (primary) lobes 2–10 in total, mostly somewhat oblong to linear, 2–30 mm long, 0.2–1.2 (2.2) mm wide, only rarely tooth-like (e.g. as in *P.S. Short 3849*). *Involucre* often c. 6.5–9 mm diam. at anthesis. *Bracts* 8–13, narrowly trullate, semi-elliptic or somewhat ovate-lanceolate, usually gradually grading to manifestly tapering towards an acute (rarely subobtuse) apex, 4.5–6.8 mm long, 1.6–2.6 mm wide, outer surface usually with biseriate, whitish eglandular hairs (sometimes also with very shortly stalked glandular hairs), sometimes glabrous or only with an occasional eglandular hair; stereome mainly herbaceous, margins and apices hyaline, upper margins mostly entire or very slightly and irregularly incised, often purplish. *Receptacle* somewhat subconical to conical, rarely hemispherical or almost so, obscurely pitted, glabrous. *Ray florets* (6) 9–18; corolla 8–22 mm long, 2.6–5 mm wide, variously described by collectors as shades of mauve or purple, “violet” and “white”; tubular part with few eglandular hairs; veins 4–6 from base reaching an entire or barely 3-lobed apex, occasionally major veins branching and/or a minor basal vein not reaching the apex also present. *Disc florets* c. (15) 30–120; corolla tube 1.5–2.2 mm long, yellow or with lobes and part of limb green, limb with a few hairs near-basally, basal tube usually glabrous. *Stamens* 5; anthers c. 0.8–1.2 mm long. *Style* c. 2.1–3 mm long; style arms c. 1–1.5 mm long, appendages somewhat oblong, c. 0.53–0.95 mm long, yellow or green, slightly shorter to slightly longer than stigmatic part which is c. 0.46–0.75 mm long. *Cypselas* inconsistently dimorphic, those of ray florets usually with both the ab/adaxial margins lacking tubercles or wing-like extensions, sometimes wing-like margins present but more developed on the inner margin than the outer margins, in disc cypselas the ad/abaxial margins always with wing-like extensions or tubercles which are equally developed on both margins; all cypselas mostly a uniform (pale to dark) brown, sometimes blackish-brown, often very minutely papillate, longitudinal ridges glabrous, usually well-delineated and apically swelling to form prominent rounded to horn-like shoulders, with a usually broad gap between the ridges and the gap with prominent tubercles but sometimes the lateral ridges not well-delineated and the lateral gap (cleft) very narrow or almost closed. *Ray cypselas* apart from lacking ab/adaxial wings usually not otherwise obviously dissimilar to disc cypselas but sometimes the longitudinal ridges more swollen and the gap between the ridges more narrow and with fewer tubercles. *Disc cypselas* laterally flattened, obovate in outline, 1.8–2.9 mm long, 1–2 mm wide (including any wing); lateral surfaces with gap between ridges usually c. 0.4–0.6 mm wide, with c. 10–30 tubercles, apices of tubercles often with short, eglandular, apically curling,

biseriate hairs (hairs may be lost from, or perhaps never present, in mature fruit); ad/abaxial margins usually with a narrow dissected wing c. 0.1–0.4 mm wide, each wing with c. 3–9 teeth, with apically curling eglandular hairs, hairs 0.14–0.55 mm long *but* a dissected wing sometimes absent (var. *integra*) or barely developed; pericarp with 2 vascular bundles and 2 secretory canals; testa cells with u-shaped thickening (P.S.Short 2026, var. *cheilocarpa*; P.S. Short 2062, var. *quobbensis*); basally with a distinct annular carpodium. Pappus crown-like, whitish, *commonly* the individual elements 2–several cells wide, uneven, c. 0.25–1.1 mm long, margins smooth or shortly denticulate, in some specimens the elements of the pappus much shorter (c. 0.02–0.1 mm long in var. *integra*). Chromosome number:  $n = 9$ . **Fig. 8A–C, 12E, F, 55–57.**

**Distribution.** Western Australia, from near Onslow in the north and south-east to about Meekatharra, and as far south as about Warriedar Homestead near the head of Mongers Lake.

**Habitat.** This is primarily a species of arid and semi-arid open shrubland and tall shrubland, commonly dominated by species of *Acacia* and *Eremophila*, and growing in sand or sandy loam. However, there are some collections indicating that it grows in heavier soil, e.g. “red-brown clay” (N.S. Lander 1317), “red dusty clay soil” (V. Long 450), “clay pans” (B. Nordenstam & A. Anderberg 261).

**Phenology & reproductive biology.** Flowering specimens of *R. cheilocarpa* have been collected in the northern part of its range in mid-June but flowering commonly occurs from about late July to mid-September, with fruiting specimens from September to about mid October.

Pollen:ovule ratios of 3,541 and 4,506 were determined for var. *cheilocarpa* and var. *quobbensis* respectively. For details see under the varieties.

Salkin et al. (1995) recorded that seed may germinate within six days of sowing but that percentage germination is low.

**Cytology.** Determinations of  $n = 9$  and  $2n = 18$  have been determined for this species by Turner (1970) and Watanabe et al. (1996b); for details see under var. *cheilocarpa*, var. *glabrata* and var. *quobbensis*.

Carter (1978a, as *Brachyscome cheilocarpa*) also recorded  $n = 9$  for this taxon but a voucher specimen has not been seen.

**Typification.** Davis (1948) chose as the lectotype specimen (MEL 2035074) one with label data in accord with the protologue, i.e. an undated specimen attributed to John Forrest and gathered from the vicinity of the Gascoyne River. She made no reference to other specimens at MEL (MEL 2035075 & MEL 2035076) and one at K which are also labelled as being collected by J. Forrest from the Gascoyne River but, unlike the lectotype specimen, are dated 1882; however, as is

evident from her annotation ‘G.L.D. 30/5/46’ on each specimen she did see the two MEL specimens prior to publication. None of the aforementioned specimens (including the lectotype) have any original labels which may have accompanied them but are on “Phytologic Museum of Melbourne” labels. The label accompanying the K specimen is also annotated as having been received, I assume by K, in August 1883 (i.e. “recd 8/83”).

I concur with Davis in her choice of lectotype specimen; indeed with no date cited in the protologue there was possibly no option to choose any other specimen. On the other hand, for many of Mueller’s names it is common for there to be discrepancies between data supplied on the labels of what are undoubted type specimens and the information cited in protologues. In this case, except for the addition of the date, the labels are otherwise in agreement and having compared elements on all four sheets I can well-believe that they are all part of the one gathering. I also note that unless the lectotype and isolectotype specimens on MEL 2035074 have been damaged, Mueller’s observation that “ligules [are] comparatively long” are likely to have been made from additional elements to these. However, I have opted to refer to the dated specimens as probable, not definite isolectotype specimens. This is because they are dated 1882. If that is the date of collection then plants would have to have been collected by Forrest and received by Mueller for description in a very short period of time; the name was published in August 1882 and the earliest herbarium record of flowering for this species is mid-June, suggesting that, contrary to my above statement, the elements on the four sheets are not part of a single gathering.

**Notes.** *Roebuckia cheilocarpa*, as here defined, is a highly polymorphic taxon, defined by having somewhat (but inconsistently) dimorphic cypselas and usually disc (and often but not always ray) cypselas which have tubercles on their lateral surfaces. Other attributes include disc cypselas in which the ad/abaxial margins usually have wing-like extensions or at least short teeth, an absence or near-absence of hairs on the basal-tube of the disc corolla (any corolla hairs usually being at the base of the limb), and bracts which usually markedly taper toward the apex.

In fact, the majority of specimens examined have disc cypselas with tuberculate lateral surfaces, swollen and sometimes horn-like shoulders on the lateral surface, ab/adaxial margins with toothed wing-like extensions and eglandular hairs along their length, and bracts with prominent eglandular hairs; all can be readily attributed to this species. The “difficult” specimens come from the western and southern margins of the distribution of the species, with all specimens not only having bracts which are glabrous – or very rarely with an occasional hair – but usually displaying additional variation in cypselas morphology and pappus development. Much of the more obvious morphological variation displayed is in the Shark Bay region where isolation of populations

along the arid coast and associated islands is presumably a good environment for evolutionary divergence.

**Variation in cypselas.** In ray cypselas it is most common for there to be a disparity between the development of the adaxial and abaxial margins, with the outer margin lacking a wing-like structure or tubercles and being smooth and glabrous or having a few hairs and, in contrast, the inner margins having tubercles (teeth) or wing-like margins. If the outer margin does have a wing-like structure or tubercles (teeth) then the respective features are always manifestly narrower or smaller than the comparable structures on the inner margin. Sometimes both the adaxial and abaxial margins lack any wing-like development or tubercles and are glabrous and smooth, as for example *P.S. Short 4339* from the Carnarvon area. However, collections from the same area, such as *B.L. Turner 5416*, have some cypselas in which both margins are smooth and others in which the outer margin is smooth but the inner has one or more tubercles or a narrow wing-like structure along its length.

Compared to disc cypselas, ray cypselas sometimes also exhibit more prominently swollen lateral ridges, a feature also correlated with a narrower cleft (gap) and fewer tubercles between the ridges.

In contrast to the cypselas of ray florets, both the adaxial and abaxial margins of cypselas found on disc florets usually have divided wing-like extensions and, although the extent to which they are divided is variable across the range of the species – and they are absent in one entity – whatever that variation may be, the margins are almost invariably equally developed.

The narrowing of the cleft and absence or near-absence of tubercles in some ray cypselas can also occur in disc cypselas; at least I interpret this as being the case for various specimens from the Carnarvon–Shark Bay region which I here refer to var. *quobbensis* and “Dirk Hartog Island entity”. Both are characterised, inter alia, by having cypselas with almost closed lateral clefts.

Swelling of the lateral ridges of the cypselas also reaches an extreme in some populations from the Shark Bay area, where cypselas may have a single smooth or tuberculate lateral ridge at maturity; such specimens are here lumped under the tag of “Turgid fruit entity”. Finally, there are specimens collected along the coast – probably from Kalbarri north to Shark Bay – in which the ab/adaxial margins of the disc cypselas are entire and may or may not have eglandular hairs; these I refer to var. *integra*.

**Variation in pappus.** A relatively well-developed pappus is typical for most specimens referred to this species, the principal variation being in the degree of toothiness on the pappus elements; for example, the elements are manifestly denticulate in *A.M. Ashby 3299* but in other collections the degree of denticulation is variable within a population, with elements in some being non-denticulate. Length of pappus elements is also highly variable and in some entities on the western range of

the species there are specimens in which the pappus is absent or virtually so, as in var. *integra* and specimens tagged under *R. cheilocarpa* as “Dirk Hartog Island entity”.

**Leaf variation.** Leaf variation may prove to be more important, but I treat the entire or shallowly lobed leaves found in *P.S. Short 3849* collected near the Overlander Roadhouse – as opposed to the common linear and near-linear lobed leaves found throughout the range of the species – as just an extreme of leaf variation. I am also aware of several collections which have some 2-pinnatisect leaves, i.e. *J.J. Alford 1314* from Salutation Island and specimens of var. *integra*.

### Key to infraspecific taxa and informal specimen groupings in *R. cheilocarpa*

1. Lateral surfaces of all disc cypselas with a distinct gap and prominent tubercles between apically swollen longitudinal ridges
2. Disc cypselas with their lateral surfaces with distinct lateral ridges and a distinct gap (cleft) with prominent tubercles between them; ab/adaxial margins of disc cypselas with wing-like extensions or tubercles and eglandular hairs; bracts always with white, eglandular hairs (Fig. 8A, B, 12E, F) . . . . . **1a. var. *cheilocarpa***
- 2: Disc cypselas differing in one or more of the features outlined for var. *cheilocarpa*; bracts usually glabrous
3. Pappus elements 0.25 mm or more long, denticulate; lateral surfaces of cypselas with horn-like swellings at apex; ab/adaxial margins of disc cypselas with wing-like extensions or tubercles and eglandular hairs; leaves 1-pinnatisect (southern margins, e.g. Pindar, Mount Magnet, Warriedar Homestead) (Fig. 55)\* . . . . . **1b. var. *glabrata***
- 3: Pappus elements c. 0.02–0.1 mm long; lateral surfaces of cypselas with apical swellings but not horn-like; ab/adaxial margins of disc cypselas mostly entire and without tubercles, eglandular hairs absent or few; leaves 1- or 2-pinnatisect (coastal or near-coastal region between Shark Bay & Greenough River) (Fig. 56)\* . . . . . **1c. var. *integra***
- 1: Lateral surfaces of many disc cypselas with a single or almost single swollen ridge with or without distinct tubercles (other cypselas in same capitulum may have two variably distinct ridges) or the lateral surfaces with a very narrow gap or cleft (sometimes absent), the cleft with or without tubercles and the longitudinal ridges often obscure
4. Cypselas often with a single or almost single swollen lateral ridge *but* some fruit with two ridges also present) (Shark Bay region) . . . . . **1f. “Turgid fruit entity”**
- 4: Cypselas with indistinct lateral ridges and a very narrow cleft or a cleft absent, no cypselas with a single ridge
5. Cypselas 1.45–2 mm long, 0.85–1 mm wide, ab/adaxial margins entire, with or without eglandular hairs; pappus a crown with individual elements 0.1–0.15 mm long (Dirk Hartog Island) . . . . . **1e. “Dirk Hartog Island entity”**
- 5: Cypselas 1.8–2.35 mm long, 1–1.65 mm wide (including any narrow wing), ab/adaxial margins sometimes entire and mostly smooth except for eglandular hairs but commonly at least the upper part of each margin forming a dissected wing; pappus elements c. 0.2–0.6 mm long (near Pt Quobba) (Fig. 8C, 57) . . . . . **1d. var. *quobbensis***

\* A specimen, *J.J. Alford 1314*, from Salutation Island (Shark Bay region) displays features somewhat intermediate between these two varieties; see note under var. *integra*.

**1a. *Roebuckia cheilocarpa* var. *cheilocarpa***

*Bracts* always with conspicuous hairs on the outer surface. *Cypselas* with distinct longitudinal ridges on lateral surfaces forming apically swollen shoulders or horns; ab/adaxial margins of disc cypselas with wing-like extensions or tubercles and eglandular hairs. *Pappus* elements with smooth or denticulate margins. *Chromosome number*:  $n = 9$ . **Fig. 8A, B, 12E, F.**

*Reproductive biology.* A pollen:ovule ratio of 3,541 was determined for a capitulum from *P.S. Short* 4339; it contained 13 ray and 87 disc florets.

*Cytology.* Turner (1970; *B.L. Turner* 5370, *B.L. Turner* 5416, the latter as *Brachyscome ciliocarpa*) recorded a haploid chromosome number of  $n = 9$  for this variety, a determination confirmed by Watanabe et al. (1996b; *P.S. Short* 4083 and presumably *P.S. Short* 4097, the latter unvouchered). An idiogram of somatic metaphase chromosomes from *P.S. Short* 4083 was published in Watanabe et al. (1999, Fig. 39).

*Distribution.* Found throughout almost all but the southernmost range as given for the species, with the most southerly collection from Barnong Station south-east of Pindar being within the general area occupied by var. *glabrata*.

***Selected specimens examined.***

WESTERN AUSTRALIA: Woodleigh Station, 2 Sept. 1959, *N.T. Burbidge* 6469 (CANB, PERTH); 16 miles from Onslow, 11 Aug. 1970, *R.C. Carolin* 7833 (PERTH, SYD); 16 km W of Gascoyne Junction, 20 Aug. 1986, *P.S. Short* 2519 et al. (AD, CANB, MEL, PERTH); c. 94 km N of Murchison River Bridge, 19 Sept. 1990, *P.S. Short* 3846 (AD, BRI, PERTH); 9 km N of turn-off to Edaggee Stn along NW Coastal Hwy, 6 Sept. 1995, *P.S. Short* 4339 (AD, MEL, PERTH, TI).

**1b. *Roebuckia cheilocarpa* var. *glabrata* P.S. Short, var. nov.**

**Type:** Western Australia. Junction of Yalgoo to Great Northern Hwy road with turn-off to Thundellarra, 28°50' 04"S, 117°02'27"E. Growing in open *Acacia* shrubland on red-brown loam. 10 Oct. 1993, *P.S. Short* 4108, *K. Watanabe*, *T. Denda* & *Y. Suzuki* (**holotype**: MEL 2018245; **isotypes**: CANB, PERTH, TI).

*Brachyscome* aff. *cheilocarpa* (B): *K. Watanabe* et al., *Muelleria* 9: 200 (1996).

*Bracts* with outer surfaces glabrous or very rarely with 1 or 2 sebate hairs. *Cypselas* with distinct longitudinal ridges on lateral surfaces, apical swellings horn-like. *Pappus* elements 0.25 mm or more long, narrow, margins denticulate. *Chromosome number*:  $2n = 18$ . **Fig. 55.**

*Distribution.* Found in the southern part of the overall distribution of the species, being in a triangular-shaped region approximately bordered by Pindar and Mount Magnet in the north and Warriedar Hstd in the south.

*Cytology.* A diploid chromosome number of  $2n = 18$  was reported by Watanabe et al. (1996b; *Short* 4108, as *B. aff. cheilocarpa* B).

*Notes.* A specimen from near Onslow (*A.S. George* 1141) – on the northern limits of the species – has bracts which have few hairs on their outer surface and as such is similar to var. *glabrata*. However, the bracts also have very short glandular hairs, the pappus elements are not or sparsely denticulate, and the apices of the lateral surfaces of the cypselas – although pronounced – are not decidedly horn-like. Other specimens with glabrous or near glabrous bracts are referable to var. *integra*, var. *quobbensis*, “Turgid fruit entity” and “Dirk Hartog Island entity”.

***Additional specimens examined.***

WESTERN AUSTRALIA: 51 km E of Mullewa on Yalgoo road, Pindar to Wurago, 29 Aug. 1980, *G.J. Keighery* 3253 (PERTH); c. 37 km S of Mt Magnet along Great Northern Highway, 17 Sept. 1990, *P.S. Short* 3830a (MEL); c. 21 km S of Mt Magnet along Great Northern Highway, 24 Aug. 1995, *P.S. Short* 4195 (MEL, PERTH, TI); Geraldton–Mt Magnet road, 25 miles E of Pindar, 10 Sept. 1966, *R.V. Smith* 66/419 (PERTH); 32 km W of Warriedar Hmsd, 26 Sept. 1986, *P.G. Wilson* 12286 (PERTH).

**1c. *Roebuckia cheilocarpa* var. *integra* P.S. Short, var. nov.**

**Type:** Western Australia. Between Shark Bay & Murchison River, *F. Mueller* (**holotype**: MEL 692820).

*Leaves* 1- or 2-pinnatisect. *Cypselas* brown or blackish-brown; lateral surfaces with distinct longitudinal ridges apically swelling to form prominent rounded shoulders, the gap wide and tuberculate; ab/adaxial margins not denticulate but entire and smooth or with occasional eglandular hairs along at least part of their length. *Pappus* a very small, sometimes almost obsolete, whitish crown, the individual elements c. 0.02–0.1 mm long. **Fig. 56.**

*Distribution.* Of the specimens available the only ones I definitely assign to this taxon were all attributed to Mueller and were collected from Shark Bay south to the vicinity of Greenough River.

A collection from Red Bluff (*M.E. Phillips* WA/68 1220, CBG 038132) appears to be of this taxon, as perhaps is *A.R. Fairall* 1228 (PERTH), a collection of plants with immature fruit gathered from nearby Kalbarri.

*Typification.* Davis (1948, p. 210) discussed the Mueller specimens of this taxon under *B. iberidifolia*, noting that “two folders of specimens were examined from Sharks Bay (10.1877, F. Mueller MEL) and one from ‘between Murchison River and Sharks Bay’ ...”. From labelling attached to MEL 692822 it is apparent that these specimens were subsequently mounted on five sheets, MEL 692187 to 692821. The specimens are collectively a mix of two taxa, the var. *integra* described here and a taxon which I simply refer to the *Brachyscome iberidifolia* complex. All specimens are accompanied by original labels which are sometimes dated, sometimes not dated. I have chosen MEL 692820 as the holotype specimen of the name var. *integra* and



do not recognise any isotypes; one can only speculate whether the elements of var. *integra* mounted on MEL 692819 and labelled as coming from “Between Murchisons River & Shark Bay Oct. 77” – as opposed to the undated “Between Shark Bay & Murchisons River” of the holotype – are also from the same gathering as the holotype.

**Etymology.** The epithet is in reference to the entire ab/adaxial margins of the fruit, a feature mostly or always lacking in the cypselas of specimens referred to the other formally recognised varieties.

**Notes.** A collection, J.J. Alford 1314 (PERTH) from Salutation Island has some attributes of this variety in that several bipinnatisect leaves are present and many cypselas have smooth ab/adaxial margins. However, other cypselas also have minute dentations and/or eglandular hairs along at least part of their length and, although rare, several also have an almost single, swollen lateral ridge; some also have “tertiary” faces. A crown-like pappus c. 0.2–0.46 mm long is also present in this specimen.

#### Additional specimens examined.

WESTERN AUSTRALIA: Shark Bay, Oct. 1877, F. Muell. (MEL 692818, MEL 692822); between Murchisons River & Shark Bay, Oct. 1877, F. Mueller (MEL 692819, p.p., mixed with *B. iberidifolia* s.lat.); Greenough River, Nov. 1877, F. Mueller (MEL 692558, p.p., mixed with *B. iberidifolia* s.lat.).

#### 1d. *Roebuckia cheilocarpa* var. *quobbensis* P.S. Short, *var. nov.*

**Type:** Western Australia. c. 200–300 m N of lighthouse at Pt Quobba, 24°29'22"S, 113°24'39"E. Growing on calcareous dunes with windswept shrubs of *Banksia ashbyi*, *Scaevola*, *Eremophila glabra* complex. 7 Oct. 1993, P.S. Short 4091, K. Watanabe, T. Denda & Y. Suzuki (**holotype**: MEL 2018229; **isotypes**: AD, PERTH, TI).

*Brachyscome* aff. *cheilocarpa* (A): K. Watan. et al., *Muelleria* 9: 200 (1996).

**Cypselas** laterally flattened and somewhat obovate in outline, 1.8–2.35 mm long, 1–1.65 mm wide (including any narrow wing), tending to be pale greyish or pale brown throughout, entire surface minutely papillate (barely visible at  $\times 10$  magnification); lateral surfaces variably swollen, usually the lateral ridges delineated, apically swelling, forming a small shoulder, with a distinct but narrow gap between them, occasionally entire surface swollen, ridges obscure and no gap present; lateral gap (when present) c. 0.04–0.16 mm wide, smooth, glabrous (except for papillate cells) or with c. 1–9 eglandular hairs terminating small tubercles; ab/adaxial margins entire, mostly smooth except for eglandular hairs, commonly at least upper part of each margin forming a dissected wing c. 0.1–0.3 mm wide, each margin with c. 7–28 eglandular hairs; eglandular hairs biseriate, 0.08–0.24 mm long, apically usually at least slightly curled, rarely almost straight and if so some hairs with curling apices usually present. **Pappus**

crown-like, individual whitish elements several cells wide, c. 0.2–0.6 mm long; length of pappus highly variable between individual plants. **Chromosome number:**  $2n = 18$ . **Fig. 8C, 57.**

**Distribution.** Western Australia, with all specimens collected within about 20 km of Point Quobba.

**Habitat.** Only known from coastal and near-coastal calcareous sand dunes, recorded associated taxa being *Banksia ashbyi*, *Eremophila glabra* s.lat. and a species of *Scaevola*.

**Phenology & reproductive biology.** The only flowering specimens were collected in early to mid October but, as evident from A.S. George's collection of plants with mature fruit in early September, flowering may occur at least as early as August.

A pollen:ovule ratio of 4,506 was determined for a capitulum of *P.S. Short* 2062; it contained 12 ray and 97 disc florets.

**Cytology.** Watanabe et al. (1996b; as *Brachyscome* aff. *cheilocarpa* A) recorded  $2n = 18$  for this variety, the voucher *P.S. Short* 4091 now also the type specimen of var. *quobbensis*.

**Etymology.** The epithet is derived from the general locality in which the species is found, Pt Quobba.

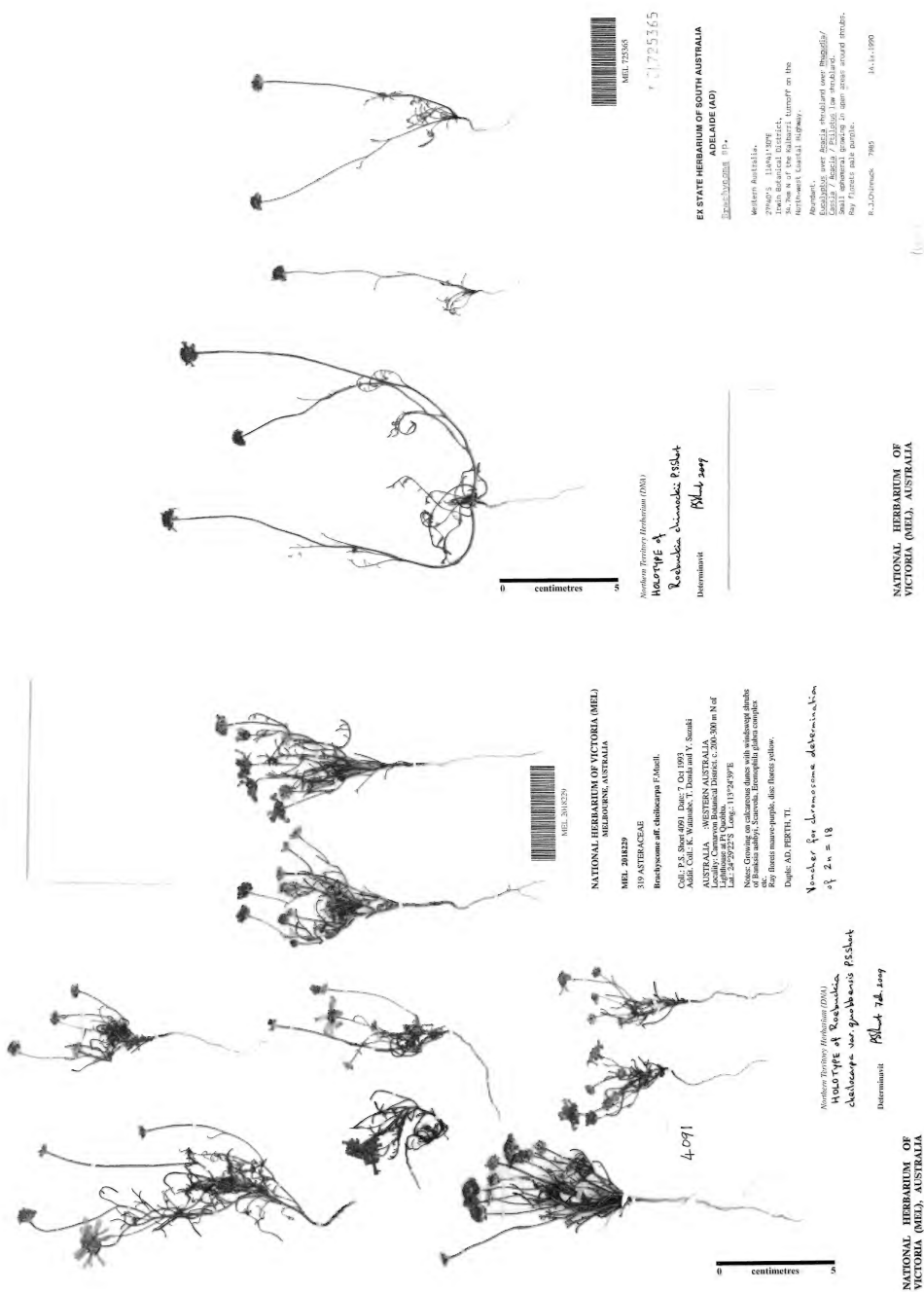
#### Additional specimens examined.

WESTERN AUSTRALIA: Quobba Lighthouse, 15 Oct. 1972, H. Demarz D4009 (PERTH); Quobba, 200 yards N of Lighthouse, 3 Sept. 1970, A.S. George 10151 (PERTH); Dorré Island, Shark Bay, 16 July 1959, R.D. Royce 5922 (PERTH), specimen immature and only tentatively referred to this variety; c. 30 km along the Blowholes/Dampier salt road from the NW Coastal Hwy, large calcareous sand dune, 14 Oct. 1983, *P.S. Short* 2062 (MEL).

Several specimens are each tagged below as “Dirk Hartog Island entity” and “Turgid fruit entity”. I deliberately give them no rank and they are not meant for use in any plant census as phrase-name taxa. They are simply used to emphasise some of the variation which exists in this species. I suggest they simply be curated under the name *R. cheilocarpa*.

#### 1e. *Roebuckia cheilocarpa* “Dirk Hartog Island entity”

As it implies, this tag refers to some specimens from Dirk Hartog Island. Whether or not they are representative of a distinct taxon worthy of formal recognition requires further examination. The specimens in question are A.S. George 11406 p.p. (PERTH), M.H. Manning (PERTH 834599) and Ph. Morat 8381 (PERTH). Cypselas in these specimens are 1.45–2 mm long, 0.85–1 mm wide, lack tubercles and, as with those of var. *quobbensis*, have a very narrow cleft; the pappus is a minute crown with individual elements 0.1–0.15 mm long (in var. *quobbensis* they are up to 0.6 mm long but highly variable). However, these specimens may not be as far removed from the afore-mentioned var. *quobben-*



**Fig. 57.** Holotype of *Roebuckia cheilocarpa* var. *quobbensis* (MEL), P.S. Short 4091 & K. Watanabe. **Fig. 58.** Holotype of *Roebuckia chinnockii* (MEL), R.J. Chinnock 7985.

sis as appearances suggest, there being occasional fruit – perhaps immature or from ray florets – which are not particularly dissimilar to specimens such as *P.S. Short* 2062. As with *var. quobbensis* eglandular hairs on the cypselas are not always distinctly apically-curved.

### *If. Roebuckia cheilocarpa* “Turgid fruit entity”

This is a tag I apply to *A.S. George* 11406 p.p. (PERTH) from Cape Ransonnnet on Dirk Hartog Island and *T.E.H. Aplin* 3456 (PERTH) from Cape Heirisson Prong; the former specimen has glabrous bracts, the latter has hairy bracts. In these specimens the lateral surfaces of cypselas may be completely swollen at maturity, with the longitudinal ridges totally obscured. However, not all fruit in the one capitulum are like this, with the longitudinal ridges distinct in many of them. As far as I can ascertain the swelling is not a simple dimorphism between ray and disc cypselas. Such fruit differ from those seen in the majority of specimens here referred to *R. cheilocarpa* and for purposes of identifying taxa I believe they had to be included in the key. However, although additional collections may indicate otherwise, I doubt that they should be seen as anything more than representing an extreme of fruit variation across the geographic range of the species.

### 2. *Roebuckia chinnockii* P.S.Short, *sp. nov.*

**Type:** Western Australia. 34.7 km N of the Kalbarri turnoff on the North West Coastal Hwy, 27°40'S, 114°41'30'E, *Eucalyptus* over *Acacia* shrubland over *Rhagodia/Cassia/Acacia/Ptilotus* low shrubland, small ephemeral herb growing in open areas around shrubs, ray florets pale purple, 14 Sept. 1990, *R.J. Chinnock* 7985 (**holotype:** MEL; **isotype:** AD, *n.v.*).

Annual *herb*, branching at basal and near-basal nodes; major axes ascending to erect, to c. 16 cm long, reddish-brown, mostly glabrous but with scattered eglandular hairs as found on the leaves present at least in the lower half but never on the upper part of the axes, some very shortly stalked glandular hairs may be present. *Leaves* basal and cauline, all c. 5–45 mm long, mainly glabrous but with whitish, septate, twisting, eglandular hairs c. 0.4–1 mm long present and often prominent basally, stalked glandular hairs not or barely 0.1 mm long may be present; first-formed leaves and sometimes uppermost leaves linear, entire, most leaves usually 1-pinnatisect; lateral lobes (1) 2–10, opposite or not, oblanceolate to linear-oblanceolate or oblong to linear, (0.7) 1.5–8 mm long, (0.01) 0.2–1.2 mm wide. *Involucre* to c. 3–6 mm diam. *Bracts* c. 8–12, semi-elliptic, ovate or obovate, apically obtuse to subacute (2.4) 3.4–4 mm long, (1.1) 1.8–2.2 mm wide, glabrous, mostly thinly herbaceous, margins and apices hyaline, very slightly and irregularly incised. *Receptacle* subconical, obscurely pitted, glabrous. *Ray florets* c. 11–15; corolla to 8 mm long, ‘purple’; tubular part with long hairs; veins c. 4 at base. *Disc floret* number undetermined; corolla tube c. 1.3–1.8 mm long, yellow or lobes and sometimes much of the limb green, limb with a moderately conspicuous

indumentum of multicellular and seemingly apically glandular hairs in c. the lower 1/3, hairs sometimes also on tube. *Stamens* 5; anthers c. 0.85–1 mm long; filament collar c. 0.17–0.25 mm long. *Style* c. 2.2–2.8 mm long; style arms c. 0.85–1.1 mm long, appendages somewhat lanceolate-oblong, c. 0.49–0.67 mm long, stigmatic part c. 0.35–0.45 mm long. *Cypselas* monomorphic, laterally flattened, somewhat obovate in outline, 1.6–2.2 mm long, 0.95–1.15 mm wide, mostly uniformly coloured yellow-brown or brown, surface very minutely papillate (visible at c.  $\times 30$  magnification); apically-joined ridges on lateral surfaces distinct only manifestly swollen at apex and then forming a glabrous horn c. 0.4–0.5 mm long, tending to be horizontal but longer ones curving upwards; lateral gap with a few apically coiled eglandular hairs with slightly swollen bases; ab/adaxial margins entire or very slightly uneven due to the bases of c. 7–17 eglandular, apically coiled hairs found along each margin; all eglandular hairs whitish, biseriate and apically-curved, 0.2–0.46 mm long; pericarp with 2 vascular bundles and 2 secretory canals; basally with a narrow, annular carpodium c. 5–6 cells wide, 0.04–0.06 mm high. *Pappus* minute, crown-like, perhaps comprising “remnant hairs” from the corolla base, individual whitish elements 0.08–0.28 mm long. *Chromosome number:* unknown. **Fig. 8E, F, 58.**

**Distribution.** Western Australia, with all specimens from an area c. 30–50 km north of the Murchison River crossing along the North West Coastal Highway.

**Habitat.** Recorded from *Acacia acuminata* woodland on red clay soil (*P.G. Wilson* 12584a) and from open areas around shrubs of *Ptilotus* and *Rhagodia* as described for the holotype specimen (see above).

**Phenology.** Flowering has been recorded from late August to mid-September.

**Etymology.** Named after Dr Robert J. Chinnock, Hon. Research Associate of the State Herbarium of South Australia. As a student I shared an office with Bob and accompanied him on my first major field trip – where we searched for compound-headed, gnaphalioid daisies and eremophilas – to Western Australia in 1977. They were good times and I learnt a lot, including how to cook with a camp oven.

**Notes.** Morphologically probably most similar to, and also geographically near, *R. nerrenensis*, but that species has a well-developed, crown-like pappus and the ab/adaxial margins of the cypselas are glabrous or almost so. In general appearance the laterally compressed cypselas are similar to those found in forms of *R. cheilocarpa* but in that species the lateral faces are usually manifestly tuberculate and the ab/adaxial margins are narrowly dissected or somewhat tuberculate, not entire; *R. cheilocarpa* also usually has a prominent pappus, although it is small in *var. integra*.

*Additional specimens examined.*

WESTERN AUSTRALIA: 26 miles N of Murchison River towards Carnarvon, Hwy no. 1, 30 Aug. 1971, *S. Smith-White* 8322-8324 (SYD); 136 km N of Geraldton on North West Coastal Highway, 23 Sept. 1987, *P.G. Wilson* 12584a (PERTH 836478).

**3. *Roebuckia ciliocarpa* (W.Fitzg.) P.S.Short, comb. nov.**

*Brachyscome ciliocarpa* W.Fitzg., J. Western Australia Nat. Hist. Soc. 2: 23 (1905) ("*Brachycomie*"); E.Salkin et al., Austral. Brachyscomes 72 (1995), p.p., as to Paynes Find illustration. — **Type citation:** "Cue, January, 1903. — C. R. P. Andrews." **Lectotype:** Cue, Jan. 1903, *C.P. Andrews* (PERTH). (Davis 1948, p. 226, Fig. 107). **Isolectotypes:** NSW 15547, PERTH.

Annual herb, branching at basal and upper nodes; major axes ascending to erect, 3–40 cm long, mostly glabrous but often with some twisted, whitish eglandular hairs particularly in leaf axils, stalked glandular hairs few or absent. *Leaves* basal and cauline, sometimes slightly fleshy, mostly cauline, at least at fruiting basal leaves usually absent; first-formed leaves and sometimes uppermost leaves linear, entire, remaining leaves usually 1-pinnatisect rarely some 2-pinnatisect, all pinnatisect leaves with 2–8 (?10) linear or near-linear lobes c. 3–28 mm long, 0.3–1.5 mm wide, all leaves c. 15–70 (100) mm long, green, may be slightly succulent, commonly glabrous or almost so, sometimes with whitish, septate, uniseriate, twisting eglandular hairs basally; stalked, septate glandular hairs few or absent. *Involucre* c. 3.5–12 mm diam. *Bracts* 8–16, somewhat elliptic, ovate or obovate, apically subobtusate, 3.9–5 mm long, 2–3 mm wide, thinly herbaceous, margins and apices hyaline, glabrous. *Receptacle* conical, pitted, with pit margins slightly raised, glabrous. *Ray florets* (5) 11–16; corolla (5.5) 12–20 mm long, 1.3–5.7 mm wide, variously described as "pale to deep lavender", "mauve", "mauve-purple", "pale to dark mauve", "pink", "pinkish", "pink-purple", "purple", "light purple", "pale purple" and "blue"; tubular base with short, apparently glandular hairs; veins (3) 4 or 5 from base, sometimes dividing distally, apices not or very shallowly 2-lobed. *Disc florets* (8) 60–100+, c. 1.6–2.9 mm long, yellow, 5-lobed, limb with a moderately conspicuous indumentum of multicellular and seemingly apically glandular hairs in c. lower 1/3, tube glabrous or with few hairs basally. *Stamens* 5; anthers c. 1.25–1.3 mm long; filament collar c. 0.28–0.35 mm long. *Style* c. 3.9–4.2 mm long; style arms c. 1.8–2.4 mm long, appendages somewhat oblong, c. 1.15–1.4 mm long, stigmatic part c. 0.65–1.0 mm long. *Cypselas* essentially monomorphic although abaxial margin of ray cypselas weaker than adaxial margin, 2.3–3.1 mm long, c. 1.2–1.35 mm wide across lateral surface, brown; longitudinal ridges apart for most of their length but apically forming a swollen shoulder, inner 'gap' smooth, somewhat obscured by dense, generally appressed, apically inrolled, eglandular, biseriate whitish hairs c. 0.25–1.8 mm long, apices of



Fig. 59. *Roebuckia ciliocarpa*, near Yalgoo, W.A. — P.S. Short 3842.

at least some upper hairs exceeding shoulders and frequently merging with the pappus; ab/adaxial margins smooth, glabrous, or with apically inrolled, eglandular hairs as on lateral surfaces, hairs basal and on upper margins, those on upper margins usually considerably overlapping, often somewhat merging with pappus; pericarp with 2 vascular bundles and 2 secretory canals; testa with thin-walled cells (*P.S. Short* 2160); carpopodium annular, whitish, very narrow. *Pappus* crown-like, individual elements to c. 1.1 mm long, often fine, 2 cells wide, sometimes less fine, 3 or 4 cells wide for part of their length. *Chromosome number*:  $n = 9$ . **Fig. 8G, H, 12G, 59.**

*Distribution.* Western Australia, throughout much of the semi-arid and arid region between latitudes c. 25° and 31°S.

*Habitat.* Commonly in open shrubland dominated by species of *Acacia*, *Eremophila* and *Senna* but also open eucalypt woodland. Usually in sand or sandy loam but with several records on heavier clay soils.

*Phenology & reproductive biology.* Flowering has been recorded from June to early October, with only fruiting specimens collected in November.

A pollen:ovule ratio of 6,923 was determined for a capitulum of *P.S. Short* 3826; it contained 13 ray and 105 disc florets.

Salkin et al. (1995) recorded that seed germinates in 8–60 days.

*Cytology.* Under the name *Brachyscome ciliocarpa*, Turner (1970, as to *B.L. Turner* 5360 & 5366) recorded a haploid chromosome number of  $n = 9$ , and Watanabe et al. (1996b, as *B. ciliocarpa*) reported  $n = 9$ ,  $2n = 18$  and  $2n = 18 + 2B$  chromosomes. Watanabe et al. (1999, Fig. 18, as *B. ciliocarpa*) published an idiogram of somatic metaphase chromosomes of this taxon.

Carter (1978a) also reported  $n = 9$  for this species but I have not seen any voucher specimens.

**Typification.** Davis (1948) chose a PERTH specimen, which she clearly annotated, as the lectotype specimen of the name *Brachyscome ciliocarpa* and when doing so referred, without comment, to a “lectoparatype” specimen in NSW. The latter specimen was not annotated by her but I assume it is that which is numbered as NSW 15547. It has a printed label “Ex. Herb. W. V. Fitzgerald ...”, gives the appropriate collection details, and the word “Typus” is written on it in what I believe is Fitzgerald’s own hand. None of the type material in PERTH has original labelling, nor is it annotated by Fitzgerald. Thus, in the normal course of events it is the NSW specimen which would have been selected as the lectotype specimen, no assumption having to be made that Fitzgerald had seen the PERTH specimens. Why Davis chose otherwise is immediately apparent on examination of NSW 15547. It is a dreadful specimen, consisting of what appears to have once been a single plant which at some stage in its history has been broken in to two parts, one part consisting of a largish branch with the root and several leaves attached but lacking a capitulum, the other part a small branchlet with a very immature capitulum in which critical floret detail has not developed. Fitzgerald could not have possibly described the species from this specimen and I have no doubt that he had access to Andrews’s specimen in PERTH, as he had for some other taxa he described (e.g. *Acacia andrewsii* W.Fitzg., see Maslin & Cowan, 1994).

**Notes.** The illustration in Salkin et al. (1995, as *Brachyscome ciliocarpa*) of specimens of this species from Paynes Find is an excellent representation of the fruit of this species.

In very mature capitula the cypselas may lose the hairs from the upper margins of the ab/adaxial margins, as appears to be the case for *P.S. Short 4410A*, although in many other specimens it appears that marginal hairs are never present; their absence is useful to distinguish such specimens from *R. oncocarpa*, e.g. as with some specimens from the Murchison River area in which the hairs on the lateral surfaces only barely overlap with the pappus.

The illustration and description of “*B. ciliocarpa*” in Grieve & Blackall (1975, p. 804) applies to one or more species of *Roebuckia*, but which one(s) is unclear.

#### *Selected specimens examined.*

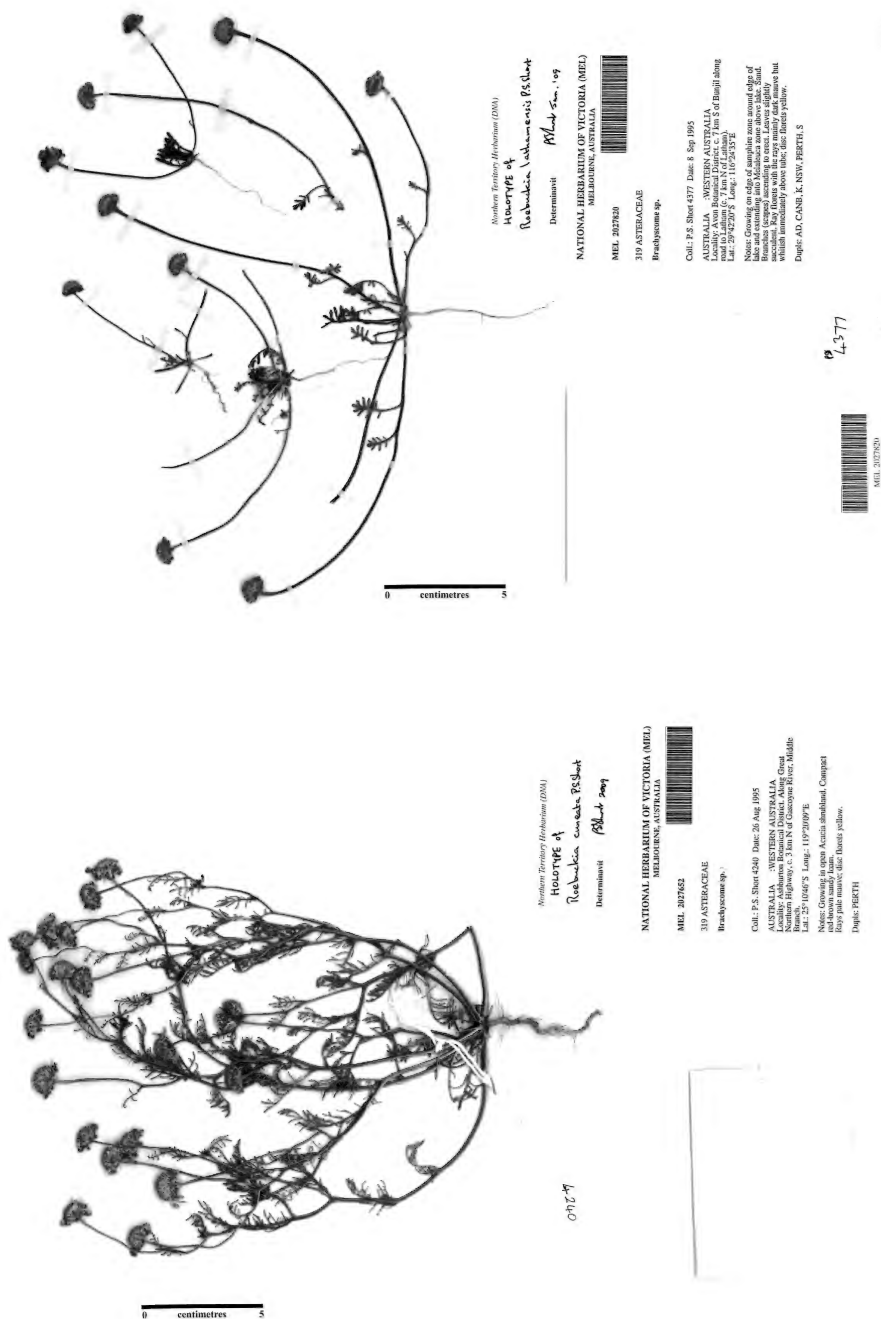
WESTERN AUSTRALIA: c. 15 km N of Cue, 12 Sept. 1992, *M.G. Corrick 10937* (MEL, PERTH); 23 miles N of Menzies, 7 Sept. 1968, *M.E. Phillips 571* (CBG, NSW); 28 km N of Cleary, 16 Sept. 1990, *P.S. Short 3814* (AD, BRI, MEL, PERTH); c. 2 km SE of Mullewa, 20 Sept. 1990, *P.S. Short 3851* (AD, MEL, PERTH); 17.5 km N of Mt Magnet, 25 Aug. 1995, *P.S. Short 4209* (AD, MEL, PERTH, TI).

#### **4. *Roebuckia cuneata* P.S.Short, sp. nov.**

**Type:** Western Australia. Along Great Northern Highway, c. 3 km N of Gascoyne River, Middle

Branch, 25°10'46'S, 119°20'09'E, growing in open *Acacia* shrubland, compact red-brown sandy loam, 26 Aug. 1995, *P.S. Short 4240* (**holotype:** MEL 2027652; **isotype:** PERTH).

Annual herb with small plants not branching or with 1 or 2 basal branches but larger plants also branching well above the base; major axes ascending to erect, c. 5–35 cm long, upper part glabrous, otherwise with an often dense indumentum of stalked glandular hairs of various lengths, ranging from 0.06–0.45 mm long, a few whitish, twisting, septate eglandular hairs longer than the glandular hairs may also be present. *Leaves* basal and cauline, the first-formed perhaps always entire and linear, leaves otherwise 7–50 mm long, mostly 1-pinnatisect, with 2–7 oblong to linear lobes, lobes 2.5–22 mm long, c. 0.5 mm wide, primary lobes occasionally with additional lobing, 2-pinnatisect; all leaves with dense stalked glandular hairs and occasional eglandular, twisted, septate hairs as on the branches. *Involucre* c. 7–10 mm diam. *Bracts* c. 15, somewhat elliptic to narrowly elliptic or obovate to oblanceolate (wider in the upper ½), apically subacute to acute, 4.5–5.3 mm long, 1.4–1.9 mm wide, sterome mainly herbaceous, conspicuously fenestrated (at least in spirit collections), central vein prominent, margins and apices hyaline, entirely glabrous. *Receptacle* hemispherical to subconical, pitted, with slightly raised pit margins, glabrous. *Ray florets* c. 10–20; corolla 9.6–12 mm long, 2.7–4.3 mm wide, variously described as ‘mauve’, ‘purple’ and ‘violet’; veins 4 or rarely 5 (if 5 then weak and not reaching the apex) basally, sometimes divided distally to c. 7 medially; apex not or barely 3- or 4-lobed. *Disc florets* c. 120–180, corolla 1.5–1.9 mm long, yellow, short hairs near base. *Stamens* 5; anthers 1.0–1.05 mm long; filament c. 0.6–0.8 mm long including collar; filament collar c. 0.15 mm long. *Style* 3–3.5 mm long; fully exerted style arms 1.45–1.6 mm long, appendages somewhat oblong, 0.9–1.0 mm long, stigmatic surface 0.55–0.6 mm long. *Cypselas* monomorphic, cuneate, 2–2.4 mm long, pale to dark brown, straight, with two longitudinal, apically-joined ridges on each lateral surface, ridges distinct but only swollen apically; lateral surfaces with a central line of eglandular straight hairs running the length of the cypselas between the longitudinal ridges, exceeding the shoulders; ab/adaxial margins entire, with a continual row of eglandular straight hairs extending along margins, tips of longest hairs level with or slightly above the pappus; all eglandular hairs biseriate, uneven in length, (0.1) 0.3–0.5 (0.8) mm long, apices minutely and evenly to slightly unevenly bifid; pericarp with 2 vascular bundles, 2 secretory canals; basally with a whitish peg-like pedicel, annular carpodium minute. *Pappus* crown-like, individual whitish elements 2 or 3 cells wide, uneven, 0.16–0.6 mm long, each element smooth or with 1 or 2 minute marginal teeth. *Chromosome number:* not recorded. **Fig. 60.**



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Fig. 60. Holotype of *Roebuckia cuneata* (MEL), P.S. Short 4240.

Fig. 61. Holotype of *Roebuckia lathamensis* var. *lathamensis* (MEL), P.S. Short 4377.

**Distribution.** North-western Western Australia, the most southerly locality near Billabong Roadhouse but extending north to Wyloo Station and Paraburdoo and north-east to the Mt Vernon area and Moorarie Stn.

**Habitat.** Recorded as growing in red sand or sandy loam among clumps of *Triodia* (P.S. Short 4304B), as being associated with *Eucalyptus camaldulensis* and *Melaleuca* sp. and growing in "red-brown sandy clay" (R. Cranfield 5775), and in *Acacia*-dominated shrubland on red-brown sandy loam, loam, and clay.

**Phenology & reproductive biology.** Flowering specimens have been collected in August and September, specimens with mature fruit in late September and October.

A pollen:ovule ratio of 6,082 was determined for a capitulum of *P.S. Short 4304B*; it contained 10 ray and 172 disc florets.

**Etymology.** The epithet relates to the wedge-shaped fruit.

**Notes.** This species differs from all other species of *Roebuckia* in having wedge-shaped cypselas with an indumentum of eglandular hairs with straight, not inrolled, apices.

It commonly grows with a taxon belonging to the *Brachyscome iberidifolia* complex; in foliage and indumentum they resemble each other and on two occasions have been erroneously collected as part of the one gathering (P.S. Short 4304 and S. Smith-White & C.R. Carter 8234). However, they are readily distinguished. The specimens belonging to the *B. iberidifolia* complex lack a pappus and have greyish fruit which lack longitudinal ridges and the few hairs which are present on the fruit are apically-curved.

#### *Additional specimens examined.*

WESTERN AUSTRALIA: Winning Pool area, 19 Aug. 1965, A.C. Beaglehole 11650 (PERTH); 10 miles NE from Wyloo Station, 26 Sept. 1968, J.V. Blockley 983 (PERTH); 2 km SW of Paraburdoo, 6 Aug. 1980, C.D. Boomsma 616 (AD); 8.9 km W of Mt Vernon Homestead, 9 Sept. 1986, P. & K. Chimock 17 (AD, MEL, PERTH); 1 km SSE of Bubbawery Bore, Moorarie Stn, 19 Aug. 1986, R.J. Cranfield 5775 (PERTH); Ashburton & Cane River, 1878, A. Forrest (MEL 692817); Wyloo Station, Barradale, 7 Aug. 1971, J.N. Hutchinson 159 (PERTH); between Pingandy and Mt Vernon Stations, 4 Sept. 1993, P.C. Luscombe 180 (MEL); Mt Vernon Homestead, 5 Sept. 1993, P.C. Luscombe 187 (MEL); 17.5 km N of Billabong Roadhouse, 3 Oct. 1989, B. Nordenstam & A. Anderberg 288 (MEL, PERTH); Yanarie River at crossing of NW Coastal Highway, 4 Sept. 1995, P.S. Short 4304B (MEL, PERTH); Murchison River, near Moorarie, 25 Aug. 1971, S. Smith-White & C. Carter 8234 (SYD, with *B. iberidifolia* s.lat. on same sheet.

#### **5. *Roebuckia halophila* (P.S.Short) P.S.Short, comb. nov.**

*Brachyscome halophila* P.S.Short, Muelleria 6(6): 393, Fig. 1 & 3 (1988); E.Salkin et al., Austral. Brachyscomes 128 (1995). — **Holotype:** Western Australia. c. 9.6 km south of Three Springs on road to Carnamah. 29°36'S.,

115°49'E. Occurring on small sand ridge in middle of dry salt lake. Associated species include *Scaevola spinescens*, *Cassia eremophila* and *Bromus rubens*. 15 Sept. 1985, B.J. Conn 2160 (MEL 1546972). **Isotypes:** AD, CANB, K 000882310, PERTH.

Annual herb, branching at basal and upper nodes; major axes ascending to erect, 10–33 cm long, glabrous or with a few scattered, whitish, septate, twisting eglandular hairs. *Leaves* basal and cauline, often very slightly succulent, first-formed leaves and often the uppermost entire and linear, c. 10–40 mm long, 1–2 mm wide, most leaves 1- pinnatisect, (10) 20–80 (c. 120) mm long, lobes somewhat oblong to linear, c. 4–22 mm long, 0.4–1.5 mm wide, all leaves green, basally decurrent, mostly glabrous except for septate eglandular hairs (as on stems) common basally; stalked septate glandular hairs few or absent. *Involucre* c. 7–8 mm diam. *Bracts* 8–14, elliptic or obovate, 2.7–5.2 mm long, 1.1–2.8 mm wide, mainly herbaceous, with hyaline apices and margins. *Receptacle* conical, pitted, glabrous. *Ray florets* 9–15; corolla (5.1) 7–10.5 (11.2) mm long, (1.6) 2–3.8 (4.1) mm wide, white or pale mauve throughout or purple-white basally; tube markedly hairy. *Disc florets* 40–118, corolla (1.7) 2–2.8 (3.2) mm long, 0.6–1.2 mm diam., usually yellow, young florets sometimes tinged red; lower part of limb and tube basally with numerous multicellular hairs. *Stamens* 5; anthers 0.75–0.96 mm long. *Style appendages* oblong, longer than stigmatic part. *Cypselas* monomorphic, 2–2.6 mm long, 1–1.5 mm wide across the lateral surface, brown to brown-black; lateral surfaces with longitudinal ridges close together, forming a groove (or narrow cleft), apically ridges forming a swollen shoulder, surfaces mostly glabrous, with apically inrolled eglandular biseriate hairs basally and on apices of the shoulders; ab/adaxial margins with prominent tubercles, tubercles with apically inrolled eglandular biseriate hairs; all eglandular hairs whitish, 0.2–0.58 mm long; pericarp with 2 vascular bundles and 2 secretory canals; testa cells thin-walled (P.S. Short 2193); carpodopodium very narrow or absent. *Pappus* absent, but a small abscission zone from the corolla may be evident. *Chromosome number:*  $n = 9$ . **Fig. 8I, J, 12H.**

**Distribution.** Western Australia. Restricted to the margins of salt lakes between Carnamah in the south and Pindar and Talling Station in the north. Lakes near Pindar and Talling Station are in the lower part of the Murchison Drainage Division and those between Carnamah and Morawa in the Monger System, a system of the South West Drainage Division (Mulcahy & Bettenay 1972).

**Habitat.** Sandy soils surrounding saline depressions; commonly associated with species of *Tecticornia*, *Maireana* and *Senecio*.

**Phenology & reproductive biology.** Flowering has been recorded from mid-August to about mid-October, with specimens with mature fruit collected as early as mid-October.



Pollen:ovule ratios determined from 15 individuals from the type collection ranged from 2,043 to 5,283 (Short 1988).

Salkin et al. (1995) recorded moderate seed germination in 7–30 days.

**Cytology.** The species has a haploid chromosome number of  $n = 9$  (Short 1988; Watanabe & Short 1992; Watanabe et al. 1996b) and Watanabe et al. (1999, Fig. 2 & 36) presented an idiogram of somatic metaphase chromosomes.

**Notes.** Specimens from the type locality – on the eastern margins of the Yarra Yarra Lakes between Carnamah and Three Springs – only have white or pale mauve rays, while those between Three Springs and Morawa and in the vicinity of Pindar and Tallering Station appear to invariably have mostly dark purple rays with, at least in some specimens, a white base. The latter is a striking form with horticultural potential.

In several fruit from *P.S. Short 2877* (near Pindar) the lateral surfaces are very swollen and no groove is apparent. However, this seems to be an aberration as numerous fruit from the same area (*P.S. Short 4101*) do not exhibit this variation.

Known to me from 15 specimens, most of which come from either the type locality or near Pindar.

#### *Selected specimens examined.*

WESTERN AUSTRALIA: near Pindar, 16 Sept. 1931, *W.E. Blackall 671* (PERTH); c. 10 km S of Three Springs, 9 Sept. 1986, *P.S. Short 2800* (AD, MEL, NSW, PERTH); c. 10 km W of Pindar, 13 Sept. 1986, *P.S. Short 2877* (AD, MEL, NSW, PERTH); c. 19 km from Morawa along main road to Three Springs, 28 Sept. 1993, *P.S. Short 4058* (MEL, PERTH); 11 km W of Pindar, 9 Oct. 1993, *P.S. Short 4101* (MEL, PERTH, TI).

#### **6. *Roebuckia lathamensis* P.S.Short, sp. nov.**

**Type:** Western Australia. Avon Botanical District. c. 7 km S of Bunjil along road to Latham, c. 7 km N of Latham, 29°42'20"S, 116°24'35"E, on edge of samphire zone around edge of lake and extending into *Melaleuca* zone above lake, 8 Sept. 1995, *P.S. Short 4377* (**holotype:** MEL 2027820; **isotypes:** AD, CANB, K, NSW, PERTH, S).

[*Brachyscome oncocarpa* auct. non Diels, Bot. Jahrb. 35: 606 (1905); E.Salkin et al., Austral. Brachyscomes 170 (1995), at least as to illustration of fruit from Mongers Lake]

Annual herb with basal and near-basal branching; major axes ascending to erect, 3–15 cm long, glabrous or almost so or with sparse to dense twisting eglandular hairs and stalked glandular hairs as on leaves. *Leaves* basal and cauline, alternate but lowermost opposite; first-formed and uppermost leaves linear, entire, most leaves 1-pinnatisect, with obovate to linear oblanceolate or oblong to linear lobes 3–12 mm long, c. 0.5 mm wide, all leaves c. 1–5 cm long, green, slightly succulent, basally decurrent, with sparse to dense whitish, septate, uniseriate, eglandular hairs and stalked, septate glandular hairs. *Involucre* 7–10.5 mm diam.

*Bracts* c. 11–13, obovate to narrowly obovate, elliptic to narrowly elliptic or ovate, 4–5 mm long, 1–2 mm wide, stereome mainly herbaceous, inconspicuously fenestrated, margins and apices hyaline, outer surface glabrous or manifestly hairy, with stalked glandular hairs and uniseriate, septate hairs as on the major axes and leaves. *Receptacle* conical, pitted, with slightly raised pit margins, glabrous. *Ray florets* 13–19; corolla 8–14 mm long, 2.2–4.7 mm wide, mauve, white at base; with uniseriate and biseriate stalked glandular hairs on tube; veins 4–7 at base, only 4 or 5 reach apex; apex minutely 2, 3 or 4-lobed. *Disc florets* c. 40–100, corolla funnel-shaped, 2.3–2.8 mm long, yellow, lower part of limb with many uniseriate and biseriate hairs 0.3–0.4 mm long, tube glabrous basally or with few hairs. *Stamens* 5; anthers 0.9–1.05 mm long. *Style arms* 1–1.3 mm long; appendages lanceolate to obovate, 0.7–1 mm long.; stigmatic surface 0.35–0.4 mm long. *Cypselas* essentially monomorphic although abaxial margin of ray cypselas weaker than adaxial margin, 1.8–2.6 mm long, brown; lateral surfaces with longitudinal ridges close together to manifestly apart for most of their length but apically forming a swollen and often somewhat horn-like shoulder, glabrous except for several apically inrolled hairs basally and on shoulder apices; ab/adaxial margins smooth, with scattered, apically inrolled, eglandular, biseriate hairs c. 0.3–0.4 mm long, hair bases not or barely swollen, margins essentially smooth; pericarp with 2 vascular bundles and 2 secretory canals; with a whitish peg-like pedicel basally, carpodium annular, minute, indistinct, sometimes possibly absent. *Pappus* crown-like, c. 0.4–0.7 mm long, of c. 15 bristle-like elements of c. equal length, each element 1 to 3 cells wide, with margins smooth or minutely and sparsely denticulate. *Chromosome number:*  $n = 9$ . **Fig. 8K, L** (var. *glabrata*), **61–63**.

**Distribution.** Found in the vicinity of Lake Moore and Mongers Lake in Western Australia, being distributed across the boundaries of the Monger System and the Avon System of palaeodrainage basins as defined by Mulcahy & Bettenay (1972).

**Habitat.** A species of sandy soil and appearing to be at least slightly tolerant of salinity. The type specimen, for example, was collected from the edge of a saline depression where it grew in sand among samphires and beneath *Melaleuca*. When collected away from the near-margins of saline depressions, plants are commonly associated with shrubby chenopods in adjoining open eucalypt woodland and *Acacia* shrubland.

**Phenology & reproductive biology.** Flowering specimens of this species has been collected from c. mid-July to early November but observations suggest that individual plants survive less than three months. Thus, flowering was well-advanced when I collected the type specimen of *R. lathamensis* on 8 Sept. 1995 but no plants or remnant seed-heads were found when the site was revisited seven weeks later.

*Cytology.* For details see under var. *glabrata*.

*Etymology.* The specific epithet is in reference to the type locality being near Latham.

*Notes.* *Roebuckia lathamensis* is undoubtedly most closely related to *R. halophila*. The two occur in neighbouring palaeodrainage lines, occupy similar habitats, and have broadly similar fruit morphologies in that the lateral surfaces are glabrous except for the hairs at the base and at the apex of the horn-like shoulders. However, the ab/adaxial margins of the fruit are essentially smooth in this species but prominently tuberculate in *R. halophila*. This difference, plus the presence of a pappus in *R. lathamensis*, has led me to treat them as distinct species rather than one, more broadly defined, species.

For an additional illustration see Salkin et al. (1995, p. 171, as *Brachyscome oncocarpa*); the eglandular hairs on the apex of the lateral horns are typical of this species and *R. halophila*.

There is considerable variation in *R. lathamensis* in regard to the vestiture of the plants. Specimen distribution suggests the variation is the result of isolation of populations between saline depressions – both within and between the Mongers and Avon systems – and I have opted to recognise three varieties, var. *lathamensis*, var. *glabrata* and var. *glandulosa*.

#### Key to varieties of *R. lathamensis*

1. Bracts glabrous (Fig. 8K, L, 62) ..... **6b. var. *glabrata***
1. Bracts with conspicuous hairs
2. General indumentum dominated by stalked glandular hairs (Fig. 63) ..... **6c. var. *glandulosa***
2. General indumentum only, or primarily, of twisting eglandular hairs (Fig. 61) ..... **6a. var. *lathamensis***

#### 6a. *Roebuckia lathamensis* var. *lathamensis*

*Leaves* and bracts with a conspicuous indumentum of twisting, whitish, septate, uniseriate, eglandular hairs; stalked glandular hairs also present but in fewer numbers and often appearing absent from leaves. *Cypselas* with few hairs on the ab/adaxial margins. **Fig. 61.**

*Distribution.* The type specimen is from the margins of a small salt lake c. 7 km S of Bunjil and the only other specimen known to me (*B.L. Turner 5354*) appears to have been collected within c. 20 kms of this locality. Both localities are in the Monger System (Mulcahy & Bettenay 1972).

*Reproductive biology.* Pollen:ovule ratios ranging from 3,407 to 5,521 were determined for five capitula from *P.S. Short 4377*.

*Notes.* As well as the difference in general indumentum, var. *lathamensis* differs from both var. *glabrata* and var. *glandulosa* in that the cypselas tend to have far fewer hairs on the ab/adaxial margins, and a narrower gap between the longitudinal ridges on the lateral surfaces. The lobes of the leaves are also obtuse rather than linear, but lobe shape varies within populations of the other

varieties (e.g. as in *P.S. Short 3821* which is referred to var. *glabrata*) and may merely reflect low sampling numbers and growth conditions.

#### *Additional specimen examined.*

WESTERN AUSTRALIA: 42 miles NNW of Wubin, 19 Aug. 1965, *B.L. Turner 5354* (MEL).

#### 6b. *Roebuckia lathamensis* var. *glabrata* P.S.Short, var. nov.

**Type:** Western Australia. 7 km S of Bimbijj Homestead turnoff along Paynes Find to Cleary road. Growing in red sandy loam on edge of samphire zone and extending into *Acacia* shrubland, 10 Oct. 1993, *P.S. Short 4120* et al. (**holotype:** MEL 2018258; **isotypes:** CANB, PERTH, TI).

*Brachyscome* aff. *cheilocarpa* (B): K. Watan. et al., *Muelleria* 9: 201 (1996).

*Leaves* with few to many eglandular twisting hairs and stalked glandular hairs. *Bracts* glabrous. *Cypselas* commonly with a conspicuous line of hairs along each of the ab/adaxial margins and the hair bases often slightly swollen. **Fig. 8K, L, 62.**

*Distribution.* Collections of var. *glabrata* are from the margins or near-vicinity of Mongers Lake and Lake Goorly in the Monger System and the margins of Lake Moore in the adjoining Avon System.

*Cytology.* A haploid chromosome number of  $n = 9$  was reported for this taxon by Watanabe & Short (1992, as *Brachyscome oncocarpa*) and Watanabe et al. (1996b; as *B. aff. cheilocarpa* (B)), the voucher on both occasions being *P.S. Short 3823*.

*Notes.* The indumentum of the leaves is highly variable, being almost absent – as in the type specimen – to quite conspicuous. In some specimens there is a general mix of both glandular and eglandular hairs while in others one hair type is by far the more common.

#### *Additional specimen examined.*

WESTERN AUSTRALIA: Lake Moore, 6 Nov. 1974, *H. Demarz 5405* (PERTH); 7 km south of Bimbijj Station turnoff along Cleary to Paynes Find road, 17 Sept. 1990, *P.S. Short 3821* (MEL, PERTH); 12 km north of turnoff to Bimbijj Station along Cleary to Paynes Find road, 17 Sept. 1990, *P.S. Short 3823* (AD, BRI, CANB, DNA, E, K, MEL, MO, PERTH); 17 km from Paynes Find along main road to Cleary, 17 Sept. 1990, *P.S. Short 3827* (MEL, PERTH); 27 km from Great Northern Hwy along road to Warriedar Homestead, 10 Oct. 1993, *P.S. Short 4118* (MEL); c. 20 km NE by road of Wubin along Great Northern Hwy, 22 Aug. 1995, *P.S. Short 4162* (AD, CANB, MEL, PERTH, TI); NW margins of Lake Goorly, 23 Aug. 1995, *P.S. Short 4164* (AD, BRI, CANB, MEL, PERTH, S, TI).

#### 6c. *Roebuckia lathamensis* var. *glandulosa* P.S.Short, var. nov.

**Type:** Western Australia. c. 40 km SW of Paynes Find along Great Northern Hwy, 29°20'57"S, 117°18'36"E, 23 Aug. 1995, *P.S. Short 4178* (**holotype:** MEL 2027591; **isotypes:** AD, PERTH, S).



*Leaves* and bracts with a conspicuous indumentum of mostly stalked glandular hairs c. 0.08–0.56 mm long. *Cypselas* with a conspicuous line of hairs along each of the ab/adaxial margins. **Fig. 63.**

*Distribution.* The few collections of var. *glandulosa* are all from a small area c. 40–60 km SW of Paynes Find and near the border between the Monger and Avon drainage systems. As far as I can ascertain the localities are just within the Avon System and on the north-western edge of Lake Moore.

*Additional specimens examined.*

WESTERN AUSTRALIA: 25 miles before Paynes Find, 10 Aug. 1963, J.S. Beard 2630 (PERTH); 238 mile peg near Paynes Find, 9 Sept. 1975, H. Demarz 5584 (PERTH); 58 km from Paynes Find along Great Northern Hwy towards Dalwallinu, 20 July 1977, I.R. Telford 5868 (CBG).

**7. *Roebuckia nerrenensis* P.S.Short, sp. nov.**

**Type:** Western Australia. North West Coastal Hwy, c. 11 km by road NNW of Carbla Homestead turnoff, c. 39 km by road NNW of Overlander Roadhouse, [c. 26° 04'30"S, 114°20'E], 2 Sept. 1977, E.N.S. Jackson 3118 (**holotype**: AD 97747662; **isotypes**: MEL, PERTH).

Annual herb, small plants not branching or with 1 or 2 basal branches, larger plants also branching well above the base; major axes ascending to erect, 3–22 cm long, glabrous. *Leaves* basal and cauline, mostly alternate but lowermost opposite, all c. 10–60 mm long, first-formed and uppermost leaves linear or linear-oblongate, entire, most leaves 1-pinnatisect; lateral lobes 2–6, oblong to linear or linear-oblongate, 3.5–18 mm long, 0.4–4 mm wide; mostly glabrous but with many whitish, septate, twisting, eglandular hairs c. 0.4–1 mm long often prominent basally, stalked glandular hairs few or absent. *Involucre* 4–7.5 mm diam. *Bracts* (5) 6–10, semi-elliptic, gradually tapering towards the subobtuse or barely acute apex, 3.4–5.2 mm long, 1.4–2.8 mm wide, glabrous, sterome mainly herbaceous, margins and apices hyaline, upper margins weakly and irregularly incised. *Receptacle* conical, pitted, with slightly raised pit margins, glabrous or with some hairs from fruit bases remaining attached. *Ray florets* (4) 7–10; corolla 6.3–12 mm long, 2.3–4 mm wide, variously white to shades of purple; tube with a few stalked glandular hairs; veins 4–7 basally, often only 4 or 5 reaching the apex; apex rounded or minutely 2- or 3-lobed. *Disc florets* 20–70, corolla 1.6–1.9 mm long, yellow, with occasional hairs, usually tube glabrous basally. *Stamens* 5; anthers c. 1 mm long. *Style arms* c. 1.15 mm long; appendages somewhat oblong and longer than the 0.4 mm stigmatic surface. *Cypselas* monomorphic, 1.9–2.3 mm long, 0.9–1.2 mm wide, mostly uniformly yellow-brown or brown, “horns” may be purplish, entire surface very minutely papillate (barely visible at ×10 magnification); apically-joined ridges on lateral surfaces distinct but only manifestly swollen at the apex and then forming a prominent glabrous horn, horn 0.5–1.2 mm long, shortest horns held horizontally, longer ones curving

slightly downwards to manifestly upwards; lateral gap with apically coiled eglandular hairs running the length of the cypselas, tips of the longest hairs well below to just exceeding the apical horns; ab/adaxial margins entire, glabrous, sometimes with 1–several hairs basally; all eglandular hairs biseriate, apically-curved, the longest c. 1 mm long; pericarp with 2 vascular bundles and 2 secretory canals; basally with a whitish peg-like pedicel and a narrow, annular carpogonium. *Pappus* crown-like, individual whitish elements several cells wide, uneven, 0.5–1 mm long, each element smooth or with occasional small denticulations. *Chromosome number*:  $n = 9$ . **Fig. 80, P. 64.**

*Distribution.* All specimens have been collected along or near the vicinity of the North West Coastal Highway, from about Nerren Nerren Station in the south to Yaringa Station in the north.

*Habitat.* Only recorded as growing in red sand and red-brown loam in tall open shrubland dominated by *Acacia*.

*Flowering period & reproductive biology.* Flowering specimens have been collected from early July to mid-August, specimens with mature fruit in September and October.

A pollen:ovule ratio of 4,118 was determined for a capitulum from E.N.S. Jackson 3118; it had 8 ray and 49 disc florets.

*Cytology.* Turner (1970; *B.L. Turner 5419*, as *Brachyscome ciliocarpa*) recorded a haploid chromosome number of  $n = 9$  for this species. Watanabe et al. (1996b; *P.S. Short 4084*, as *B. oncocarpa*) recorded  $2n = 18$  and Watanabe et al. (1999, Fig. 28; *P.S. Short 4084*, as *B. oncocarpa*) published an idiogram of somatic metaphase chromosomes.

*Etymology.* The epithet is derived from one of the localities from which the species has been collected, Nerren Nerren Station.

*Additional specimens examined.*

WESTERN AUSTRALIA: 492 mile peg NW Coastal Hwy, 2 July 1970, T.E.H. Aplin 3158 (PERTH); Yaringa Station, 8 Aug. 1964, J. Galbraith WA303 (MEL), p.p., excl. *Calotis* sp. & *Roebuckia oncocarpa*; 16 km S of Nerren Nerren Hmsd, Aug.–Sept. 1980, C.A. Howard & T.F. Houston 329-2 (PERTH); 2.5 miles S of Wannoo, 16 Sept. 1968, M.E. Phillips WA/68 1090 (CBG); c. 96 km N of Murchison River along NW Coastal Hwy, 14 Aug. 1986, P.S. Short 2444 (MEL); c. 100 km N of Galena Bridge along NW Coastal Hwy, 6 Oct. 1993, P.S. Short 4084 (MEL); 100 miles S of Carnarvon, 26 Aug. 1965, B.L. Turner 5419 (MEL, PERTH).

**8. *Roebuckia oncocarpa* (Diels) P.S.Short, comb. nov.**

*Brachyscome oncocarpa* Diels, Bot. Jahrb. 35: 606 (1905) (“*Brachyscome*”); G.L.R. Davis, Proc. Linn. Soc. New South Wales 73: 227, Fig. 108, ?116–118 (1948) (“*Brachyscome*”), p.p., excl. Blackall’s specimen from near Pindar). — **Type citation:** “Hab. in distr. Austin pr. Carnarvon in lutosus nudis copiosa flor. m. Aug. (D. 4286).” **Lectotype:** Carnarvon, Aug. 1901, L. Diels 4286 (MEL 662236 p.p., ex herb. Königl. Botanischer Garten und Museum). (Davis

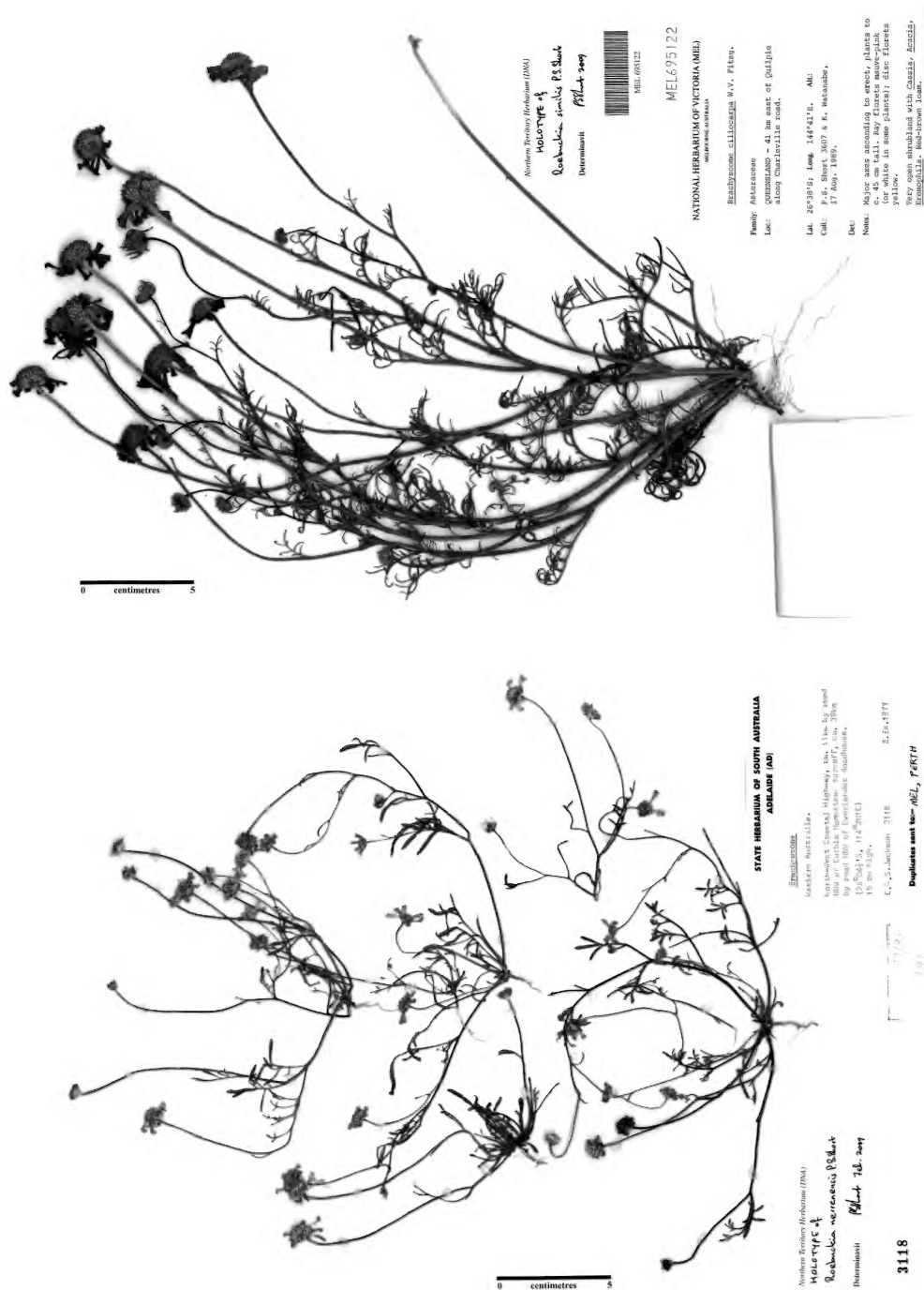


Fig. 65. Holotype of *Roebuckia similis* (MEL), P.S.Short 3607 & K. Watanabe.

Fig. 64. Holotype of *Roebuckia nerrenensis* (AD), E.N.S. Jackson 3118.

1948, p. 227, text Fig. 108 & p. 228). **Isolectotypes:** (MEL 662236 p.p., PR n.v.).

Annual *herb*, sometimes branching at or near base but commonly further along an obvious main stem; major axes ascending to erect, 6–40 cm long, mostly glabrous but with some twisted eglandular hairs and stalked glandular hairs present. *Leaves* mostly cauline, at least at fruiting basal leaves usually absent; first-formed and uppermost leaves linear, entire, remaining leaves 1-pinnatisect, with linear or near-linear lobes 5–20 mm long, 0.5–1.5 mm wide, all leaves 3.5–45 mm long, green, sometimes slightly succulent, commonly glabrous or almost so, at least basally with whitish, septate, uniseriate, twisting eglandular hairs c. 0.5–1 mm long, and sometimes stalked, septate glandular hairs. *Involucre* c. 6–8 mm diam. (measured in fruit). *Bracts* c. 9–12, often somewhat elliptic or obovate to narrowly obovate, apically obtuse but some somewhat acute, all bracts 4.7–5.3 long, 1.5–2.1 mm wide, mainly thinly herbaceous, margins and apices hyaline, glabrous. *Receptacle* conical, pitted, with slightly raised pit margins, glabrous. *Ray florets* 9–16; corolla to c. 15 mm long, c. 3 mm wide, mauve or pale mauve; tube with short, apparently glandular hairs; veins c. 4–6. *Disc florets* not counted, c. 1.6–2.1 mm long, yellow, 5-lobed, with a short indumentum near-basally. *Stamens* 5; anthers c. 1–1.2 mm long; filament c. 0.7–0.8 mm long, filament collar c. 0.17–0.2 mm long. *Style* c. 3–3.2 mm long; style arms c. 1–1.1 mm long, appendages somewhat oblong, c. 0.64–0.68 mm long, stigmatic part c. 0.36–0.45 mm long. *Cypselas* essentially monomorphic, abaxial margin of the ray cypselas sometimes weaker than adaxial margin, 1.9–2.7 mm long, c. 1.2–1.3 mm wide laterally, brown; longitudinal ridges manifestly apart for most of their length, apically forming a swollen shoulder, inner ‘gap’ smooth, obscured dense generally appressed, apically inrolled, eglandular, biseriate whitish or brownish hairs to c. 0.8 mm long, apices of hairs equalling or barely exceeding shoulders; ab/adaxial margins smooth, with apically inrolled, eglandular hairs as on lateral surfaces, hairs sometimes scattered along the margins, usually at full maturity confined to near the base and on the upper c. 1/5 of the margins where their apices about equal the pappus; pericarp with 2 vascular bundles and 2 secretory canals; carpodium annular, whitish, several cells wide. *Pappus* crown-like, c. 0.3–0.65 mm long, of c. 15–20 bristle-like elements, each element 2 or 3 cells wide, with smooth or sparsely denticulate margins. *Chromosome number:* ?*n* = 9. **Fig. 8M.**

**Distribution.** Western Australia, mostly in a near-coastal band – west of c. 114°30'E – from possibly about Yaringa and Carnarvon in the south and north to North West Cape.

**Habitat.** A species recorded as growing on sandy soil or loam. At Cape Range noted to be in open areas between clumps of *Triodia*, at Lyndon River in slightly saline

floodplain areas with shrubs of *Atriplex* and samphire, and further south in shrubland dominated by species of *Acacia*, *Atriplex*, *Maireana*, *Solanum* and *Ptilotus obovatus*.

**Phenology.** Flowering has been recorded from early June to early October, but usually only fruiting specimens are collected in October.

**Typification.** Davis (1948) did not annotate the lectotype specimen but from the illustration she provided it is clearly the single plant on the bottom left of the sheet MEL 662236, with a remaining plant on the upper right and material in a fragment bag constituting an isolectotype. Additional isolectotypes are presumably housed in PR.

**Cytology.** Carter (1978a) recorded *n* = 9 for this species but I have not seen any voucher specimens to substantiate the record. The determination of *2n* = 18 published for the species by Watanabe et al. (1996b) pertains to *R. nerrenensis*.

**Notes.** A single fruit with a poorly developed tertiary face was seen in *A.S. George* 1243.

A specimen “Yaringa Station, 8 Aug. 1964, *J. Galbraith* WA303” (MEL 220334) contains elements of three different taxa: *Calotis multicaulis* (Turcz.) Druce, *R. nerrenensis* and another entity which may be of this species. It has very immature fruit with prominent hairs along the ab/adaxial margins but as noted in the above description most such hairs appear to be lost as cypselas mature; although it is a poor specimen the upper tapering in the bracts also suggests its placement in *R. oncocarpa*.

The illustration and description of “*B. oncocarpa*” in Grieve & Blackall (1975, p. 805) applies to one or more species of *Roebuckia* but which one(s) is unclear.

#### *Additional specimens examined.*

WESTERN AUSTRALIA: Cape Range, 4 miles N of Learmouth Camp, 4 Sept. 1964, *Y. Chadwick* 1467 (PERTH, 2 sheets); Yaringa Station, 8 Aug. 1964, *J. Galbraith* WA303 (MEL 220334), p.p., excl. *Calotis multicaulis* & *R. nerrenensis*; 14 miles E of Bullara, 29 Aug. 1960, *A.S. George* 1243 (PERTH); 9 miles N of Learmouth, 30 Aug. 1960, *A.S. George* 1290 (PERTH); Lyndon River, Learmouth road, 2 June 1961, *A.S. George* 2513A (PERTH); c. 20 miles NE of Ningaloo Stn Hmsd, 5 Sept. 1970, *A.S. George* 10244 (PERTH); Pilgonaman Creek, Cape Range N.P., 26 July 1980, *K.F. Kenneally* 7309 (CANB, PERTH); near Mt. King, Cape Range, 18 Aug. 1956, *K.M. McWhae* (PERTH 394165); Lyndon River crossing along the Minilya to Exmouth road, 13 Oct. 1983, *P.S. Short* 2042 (MEL); 21 km from Carnarvon along road to Gascoyne Junction, 7 Oct. 1993, *P.S. Short* 4088 et al. (MEL); c. 33 km from Blowholes along road to Carnarvon, 7 Oct. 1993, *P.S. Short* 4095 et al. (MEL); Lyndon River crossing on Exmouth to Minilya road, 5 Sept. 1995, *P.S. Short* 4324 (AD, CANB, MEL, NSW, PERTH, S).

#### **9. *Roebuckia similis* P.S.Short, sp. nov.**

**Type:** Queensland. 41 km E of Quilpie along Charleville road, 26°38'S, 144°41'E, very open shrubland with *Cassia* [= *Senna*], *Acacia*, *Eremophila*,

red-brown loam. 17 Aug. 1989, P.S. Short 3607 & K. Watanabe (**holotype**: MEL 695122; **isotypes**: AD, BRI, CANB, E, NSW, PERTH, TNS).

*Brachyscome* sp. *Wanna Munna Flats* (S. van Leeuwen 4662) (PERTH, Florabase).

*Brachyscome* sp. aff. *ciliocarpa*: K.Watan. et al., Muelleria 9: 202 (1996).

[*Brachyscome ciliocarpa* auct. non W.Fitzg.: G.L.R.Davis, Proc. Linn. Soc. New South Wales 73: 226 (1948) ("*Brachycome*"), p.p., at least as to eastern Australian specimens; G.M.Cunningham et al., Pl. W. New South Wales 652 (1981) ("*Brachycome*"), excluding Fig. 64w taken from Davis (1948, Fig. 115); E.Salkin et al., Austral. Brachyscomes 72 (1995), p.p., as to eastern Australian account, incl. illustration p. 75]

Annual *herb*, branching at basal and upper nodes; major axes ascending to erect, to c. 35 cm long, usually with a mostly conspicuous indumentum of stalked glandular hairs on stems and leaves, glandular hairs similar or variable in length, with narrow or triangular bases, 0.07–0.6 mm long, a few somewhat straight to twisted, eglandular, whitish, septate hairs sometimes present, *sometimes* plants glabrous or almost so. *Leaves* basal and cauline, c. 10–60 mm long, glabrous or with stalked glandular hairs and septate hairs as above, first-formed and sometimes uppermost leaf linear, entire, leaves mostly 1- or sometimes 2-pinnatisect; primary lateral lobes 2–8, sub-linear or linear 3.5–30 mm long, 0.6–2.2 mm wide, secondary lobes smaller. *Involucre* 5.3–10.6 mm diam. *Bracts* 12–17, somewhat rhombic, obovate or ovate, 3.4–5.7 mm long, 1.5–3.8 mm wide, apices obtuse to acute but never long-tapering, surface glabrous, stereome mainly herbaceous, margins and apices hyaline, often purplish, entire or almost so. *Receptacle* subconical to conical, pitted, with slightly raised pit margins, glabrous or with some hairs from fruit bases remaining attached. *Ray florets* 11–18; corolla 8.6–18.7 mm long, c. 3–4 mm wide, variously recorded by collectors as "mauve", "pink", "blue", only rarely as white; tube with multicellular hairs; veins 4 or more; apex rounded or minutely 2- or 3-lobed. *Disc florets* 65–300 (337), corolla 1.6–2.6 mm long, yellow, limb often with numerous external hairs, tube glabrous or hairy basally. *Stamens* 5; anthers 1.06–1.5 mm long. *Style* 2.05–2.6 mm long; arms 1.24–1.57 mm long; appendages somewhat oblong and (?always) longer than stigmatic surface. *Cypselas* essentially monomorphic, adaxial margin of the ray cypselas often weaker than abaxial margin, 3- or 4-faced fruits may be present, 1.9–2.95 mm long, 0.9–1.5 mm wide laterally, brown; longitudinal ridges barely to distinctly swollen for much of their length, apically always forming a swollen shoulder; lateral gap always distinct but if ridges swollen for most of their length then gap narrow; eglandular hairs of variable density, generally not obscuring surface of the gap, sometimes absent, hairs 0.1–0.75 mm long, apices usually not or barely reaching apical shoulders of cypselas, a few rarely just exceeding it, never manifestly merging with the pappus; minute papillae absent or present; ab/adaxial margins smooth, with or without

apically inrolled, eglandular hairs scattered along their length with only 1 or 2 slightly overlapping with the pappus, hairs about equalling or shorter than those on lateral surfaces; pericarp with usually 2 secretory canals but 3, 5 and 6 observed in 3- or 4-faced fruit, with a continual layer of sclerenchyma around the seed, the layer narrow in lateral gaps, collenchyma seemingly restricted to swollen parts of lateral ridges; testa cells thin-walled (*H. Demarz* 615; *P.S. Short* 3607); carpopodium narrow, whitish or pale brown. *Pappus* crown-like, individual elements weak or firm, each element 0.3–0.9 mm long, 2 or 3 cells wide, with smooth or sparsely denticulate margins. *Chromosome number*:  $n = 9$ . **Fig. 8N, 65.**

*Distribution*. Western Australia, south-western Queensland and north-western New South Wales.

*Habitat*. Typically recorded from open, often *Acacia*-dominated, arid shrubland and growing in red-brown loam; also recorded from sandy soil and clay loam.

*Flowering period and reproductive biology*. Flowering has been recorded from April to November.

Pollen:ovule ratios ranging from 1,131 to 7,111 were determined for 15 capitula from *P.S. Short* 3607. The large range of values reflects the fact that in 11 of the individual florets examined few (as low as 1%) to many pollen grains (as high as 82%) did not appear to be properly formed and for the purpose of calculating pollen:ovule ratios were considered to be sterile. The lowest pollen:ovule ratio of 1,131 was determined for a capitulum in which 82% of grains in the floret were considered sterile, the highest value of 7,111 was estimated for one of the four individuals in which all pollen grains appeared normal.

*Cytology*. Watanabe & Short (1992, as *B. ciliocarpa*; Watanabe et al. 1996b, as *B. sp. aff. ciliocarpa*) reported determinations of  $n = 9$  and  $2n = 18$  from a Queensland population, *P.S. Short* 3607, the voucher for which is now the type specimen.

Smith-White et al. (1970) reported  $n = 8$  for this species from a collection made near Cunnamulla, Queensland; no voucher specimen has been seen and in view of the above determinations appears unlikely.

*Etymology*. The epithet reflects the fact that it is similar to others, in particular *R. ciliocarpa* and *R. oncocarpa*, but does not have any outstanding unique features.

*Notes*. This is a variable and broadly-defined taxon requiring further examination. For example, in regard to the general indumentum, stalked glandular hairs are frequently abundant but there are also many specimens which may be near-glabrous, and some (e.g. *L. Craven* 5064) in which there are few stalked glandular hairs, but septate, eglandular hairs are abundant. As will be evident from the above description hairs also vary greatly in size and shape. The degree to which the longitudinal ridges of the cypselas swell is also variable,



e.g. they are particularly swollen in many cypselas of the type specimen – and as a consequence the lateral gap is frequently narrow – but such swelling is not or only occasionally evident in many specimens. Specimens, particularly from the Pilbara, also produce occasional cypselas with 3 or even 4 faces. The length of hairs on the cypselas is extremely variable, sometimes even on the same cypselas and, in some specimens which occur sporadically in the southern half of the overall range in Western Australia, the cypselas are glabrous or near-glabrous (e.g. *N.T. Burbidge & A. Kanis 8153* p.p., *P.S. Short 3831a*, *P.S. Short 4397*, *P.S. Short 4410B*, *R.V. Smith 66/488*, *D.G. Wilcox* PERTH 412686). Not only are the fruit glabrous or near-glabrous but so too are the plants and, of the above specimens, several have been collected with *R. ciliocarpa* and I have entertained the idea that perhaps they are an aberrant form better placed with that species; alternatively it can be interpreted as showing that they are indeed a different taxon, as is accepted here in my placing them in *R. similis*.

The illustration in Salkin et al. (1995, as *Brachyscome ciliocarpa*) of specimens of this species from eastern Australia is an excellent representation of the species but it should be noted that the pappus is not included in the illustration of cypselas. The cypselas themselves have the comparatively swollen longitudinal ridges and narrow lateral gap typical of many in the type specimen and found to a variable degree, or not at all, in other specimens included in this variable species.

#### *Selected specimens examined.*

WESTERN AUSTRALIA: Windidda Station, between Acacia Bore and Bilgarrie Cutarrie Bore, 7 Sept. 1973, *R.J. Chinnock 863* (AD, PERTH); 14 miles E of Carnegie Homestead, 26 July 1963, *A.S. George 5502* (PERTH); c. 10 km S of turn-off to Bulloo Downs along Great Northern Hwy, 27 Aug. 1995, *P.S. Short 4250* (AD, CANB, K, MEL, NSW, PERTH, S); 2 km towards Nullagine along Marble Bar road from junction with Great Northern Hwy, 28 Aug. 1995, *P.S. Short 4256* (AD, MEL, PERTH, S, TI); 27 km from Tom Price along private railway road to Dampier, 31 Aug. 1995, *P.S. Short 4284* (AD, CANB, MEL, NSW, PERTH, TI).

QUEENSLAND: Pithery Stn, S of Eulo, 19 Sept. 1944, *G.H. Allen 633* (CANB, 2 sheets); a few miles E of Quilpie, 21 Sept. 1978, *K.L. Kay* (BRI 241445); 4.8 km E of Eulo, 6 Oct. 1996, *K. Watanabe 653* (BRI, MEL, TI); 94 miles W of Cunnamulla, 27 Sept. 1968, *K. Williams 111* (BRI); Cheepie–Quilpie road, 14 Aug. 1978, *K.A. Williams 78126* (BRI).

NEW SOUTH WALES: Waverley Downs–Hungerford, Oct. 1912, *J.L. Boorman* (NSW 15549); Mt Grenfell, 13 July 1973, *G.M. Cunningham & P.L. Milthorpe 927* (NSW); Fort Grey, 18 Sept. 1973, *G.M. Cunningham & P.L. Milthorpe 1142* (NSW); 1–3 km S of Olive Downs, 7 Sept. 1981, *W. Greuter 18491* (MEL, NSW); Tundulya, 20 Sept. 1966, *C.W.E. Moore 4036* (CANB).

### Names of uncertain application

With the exception of the name *B. tenera* Benth., the following names were published by Wilhelm Gerhard [Guilielmo Gerardo] Walpers. His personal herbarium, containing many of his types, was sold after his death and its location is unknown (Stafleu & Cowan 1976–1988).

#### *Brachyscome capillacea* Walp.

Rept. Bot. Syst. 2: 584 (Aug. 1843) (“*Brachycome*”). — **Type citation:** “Crescit in Nova Hollandia ad Swan River.”

Included by Steetz (1845) under *B. iberidifolia*. Steetz indicated that it was certainly not different from that species and that he had seen a specimen under this name at B. The type was not seen by Bentham (1867). Following Steetz I have also included it in synonymy under a broadly-defined *B. iberidifolia*.

#### *Brachyscome drummondii* Walp.

Rept. Bot. Syst. 2: 584 (Aug. 1843) (“*Brachycome*”). — **Type citation:** “crescit in Nova Hollandia ad Swan River (v.s. sp.).”

Following Steetz (1845), this is referable to the *B. ciliaris* complex.

#### *Brachyscome glauca* Walp.

Linnaea 14: 315 (Aug.–Dec. 1840 or 1841) (“*Brachycome*”), Rept. Bot. Syst. 2: 584 (Aug. 1843) (“*Brachycome*”). — **Type citation:** “In Nova Hollandia Lhotsky legit.”

Sonder (1853, p. 477) listed the species, noting “fide spec. authent. a beat Lucae commun. Australia felix, Joisse.” According to Stafleu & Cowan (1976–1988), duplicates of Lucae’s herbarium are at BR, MW, P & W. I did not see an appropriately labelled specimen in W during a visit in 2006 but have not checked the other herbaria. I have also searched in MEL, where much of Sonder’s personal herbarium is housed (e.g. Short 1990), but to no avail. Walpers indicated that the species is close to *B. marginata* [= *B. dentata*]. Bentham listed it under *B. stricta* (i.e. *B. aculeata*), but it was not placed under *B. aculeata* by Stace (1981).

#### *Brachyscome pumila* Walp.

Rept. Bot. Syst. 2: 584 (Aug. 1843) (“*Brachycome*”). — **Type citation:** “Crescit in Van Diemen’s Land.”

Hooker (1856) saw no specimen but indicated that one was lodged at “*Herb. Berlin*”. He also felt that it may be synonymous with *Lagenophora billardierei* [= *L. stipitata* (Labill.) Druce]. Davis (1950b, p. 128), in her revision of *Lagenophora*, recorded that

Bentham (1866), quoting Steetz (1845), listed *Brachycome pumila* in his synonymy of *L. Billardièri*, but, in view of the fact that in the original description Walpers (1843) stated “pappus shortly coronate”, the present writer has omitted it from the synonymy, pending Walpers’s specimen ... being traced.

Sonder (1853), in his *Plantae Muellerianae*, cited *B. pumila* as a synonym of *Lagenophora latifolia* Hook.f., itself now treated as a synonym of *L. stipitata* (Labill.)

Druce, as per Australian Plant Census ([www.anbg.gov.au/chah/apc](http://www.anbg.gov.au/chah/apc); accessed May 2014).

***Brachyscome stronglylosperoides* Walp.**

Linnaea 14: 305 (Aug.–Dec. 1840 or 1841) (“*Brachyscome*”), Repert. Bot. Syst. 2: 584 (Aug. 1843) (“*Brachyscome*”). — **Type citation:** “In Nova Hollandia legit Lhotsky.”

Davis (1948) could not locate syntype material but included the name in synonymy under *B. rigidula*, a placement in accord with Benth (1867) placing it in synonymy, along with the names *B. squalida*, *B. multicaulis* and *Steiroglossa rigidula* under his *B. ciliaris* var. *robusta* Benth. This may well be correct but Walpers recorded it as having affinities with *B. tenera*.

***Brachyscome tenera* Benth.**

in Endl. et al., Enum. Pl. Huegel 59 (1837) (“*Brachyscome*”).

This name appears to apply to a taxon belonging to the *B. multifida* complex (sensu Davis) and is further discussed above.

**Excluded names**

A number of species which are not from Australia, New Zealand or New Guinea have been placed in *Brachyscome*. As far as I am aware none of them have strong affinities to any species treated here. Also listed here is the name *B. clementii* which has been applied to an Australian species which belongs to *Calotis* sensu Davis.

***Brachyscome assamica* C.B. Clarke**

Compos. Ind. 40 (1876) (“*Brachyscome*”). — **Type citation:** “In Assamia superiore ad Namsang in saxis fluminis Dihing.”

I have not seen specimens attributed to this species, but the locality alone suggests that it has no place in *Brachyscome*, and the original description of it as having terete, striate and shortly beaked cypselas indicates that this is the case. A neotype specimen has been selected by Barbhuiya (2014).

***Brachyscome carnosa* (Aiton) M.R. Almeida**

Fl. Maharashtra 3A: 86 (2001). — *Cacalia carnosa* Aiton, Hort. Kew 3: 156 (1789).

= *Senecio elegans* L.

George (2003) reported on this publication, not seen by me, in which the above combination was made. He noted that the basionym, *Cacalia carnosa* Aiton is a name applied to a species native to the Cape of Good Hope and is considered to be a synonym of *Senecio elegans* L., and that the name *B. iberidifolia* was inexplicably cited as a synonym.

***Brachyscome clementii* Domin**

Biblioth. Bot. 22(89<sup>8</sup>): 1208 (Feb. 1930). — **Type citation:** “Nordwest-Australien: zwischen Ashburton- und De Gray River, E. Clement.” **Type:** N.W. Australia: inter Ashburton et De Gray River. *E. Clement* (PR 531491–531494). = *Calotis porphyroglossa* F.Muell. ex Benth.

Davis (1948) did not see type material of this species nor attribute any specimens to the name, but provided an

English translation of the original Latin description and noted that from the “description there seems no doubt that this [species] is actually *B. cheilocarpa*”. However, type specimens of the name *B. clementii* are of a species of *Calotis*, fitting Davis’s (1952) concepts of the earlier-named and somewhat variable *Calotis porphyroglossa* F.Muell. ex Benth.

There are four sheets in PR. All have a small, printed label simply stating “N.W. Australia, Between the Ashburton and de Gray Rivers. Dr. E. Clement. Purchased Aug. 1900.” All four also have a printed Domin *Iter Australiense* label bearing both its own number, the PR sheet number, and recording the same location (in Latin) as the above label but recording “legit” August 1900, i.e. that they were gathered by Clement at that time. None of the specimens are annotated in Domin’s hand but have the typed annotation “*Brachyscome Clementii* Domin n.sp.” on the *Iter Australiense* label. None have a collector’s number and it is not clear whether all four sheets are of a single gathering or of two or more gatherings from the same general area. However, all are in excellent condition and are undoubtedly representative of a single taxon. I have simply annotated each as a type specimen of the name *B. clementii* Domin.

Kanis (1977) provided notes regarding Domin’s collections of Australian plants, indicating that Domin studied Clement’s collections when working for a while at K and that Domin obtained “a rather complete set of duplicates” for himself. I searched for a type specimen at K under the name *B. clementii* but failed to find one.

***Brachyscome hispida* (Vatke) Klatt**

Leopoldina 25: 108 (1889).

= *Gyrodome hispida* (Vatke) Wild

Referral to *Gyrodome hispida* follows the *Flora of Mozambique* ([www.mozambiqueflora.com/speciesdata/species.php?species\\_id=169760](http://www.mozambiqueflora.com/speciesdata/species.php?species_id=169760); accessed 27 Mar. 2013).

***Brachyscome mexicana* (A.Gray) Klatt**

Leopoldina 19: 32 (1883).

= *Erigeron galeottii* (A.Gray) Greene.

Referral to *E. galeottii* follows *The Plant List* ([www.theplantlist.org/tpl/record/gcc-130471](http://www.theplantlist.org/tpl/record/gcc-130471); accessed 27 Mar. 2013). First described as *Bellis mexicana* A.Gray, it is evident from the type specimen (JSTOR Plant Science web site, [plants.jstor.org/](http://plants.jstor.org/); accessed 27 Mar. 2013) that this native of Mexico has also been referred to *Astranthium mexicanum* (A.Gray) Larsen and *Achaetogeron mexicanus* (A.Gray) De Jong before being reduced to synonymy under *E. galeottii*.

***Brachyscome mossambicensis* Oliv. & Hiern**

Fl. Trop. Afr. 3: 305 (1877) (“*Brachyscome*”).

= *Gyrodome hispida* (Vatke) Wild

Referral to *Gyrodome hispida* follows the *Flora of Mozambique* ([www.mozambiqueflora.com/speciesdata/species.php?species\\_id=169760](http://www.mozambiqueflora.com/speciesdata/species.php?species_id=169760); accessed 27 Mar. 2013).

***Brachyscome neocaledonica* Guillaumin**

Bull. Soc. Bot. France 84: 61 (1937).

= *Pytinicarpa neocaledonica* (Guillaumin) G.L. Nesom

See Nesom (1994, 2001).

***Brachyscome palustris* O.Hoffm.**

Bot. Jahrb. Syst. 30: 427 (1901) ("*Brachycome*").

= *Jeffreya palustris* (O.Hoffm.) Wild.

For example, see Beentje (2002).

***Brachyscome sarasinii* Däniker**

Vierteljahrsschr. Naturf. Ges. Zürich Beibl. 19 (78): 479 (1933) [Mitt. Bot. Mus. Univ. Zürich 142].

= *Pytinicarpa sarasinii* (Däniker) G.L. Nesom

See Nesom (1994, 2001).

***Brachyscome sylvestris* Klatt**

Leopoldina 19: 32 (1883).

= *Bellis sylvestris* Crillo

Referral to *B. sylvestris* follows *The Plant List* ([www.theplantlist.org/tpl/record/gcc-86421](http://www.theplantlist.org/tpl/record/gcc-86421); accessed 27 Mar. 2013).

***Brachyscome xanthocomoides* Less.**

Syn. Gen. Compos. 192 (July–Aug. 1832) ("*Brachycome*"; Schlecht., Linnaea 9: 265 (1835) ("*Brachyscome*").

= *Astranthium xanthocomoides* (Less.) Larsen.

See Larsen (1933).

***Brachyscome xeranthemoides* Steud.**

Nomencl. bot. (2nd ed.) 1: 220 (1840) ("*Brachycome*").

= *Astranthium xanthocomoides* (Less.) Larsen.

Treated by Larsen (1933) as a typographical error for *B. xanthocomoides* Less.

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**Appendix 1.** Morphological characters coded in Appendix 2; for detailed descriptions see pp. 7–23.

1. **Duration:** (0) perennial; (1) annual.
2. **Habit:** (0) shrub; (1) herb.
3. **Branches corky at base:** (0) absent; (1) present.
4. **Rosetted-herbs:** (0) absent; (1) scapose; (2) scapiform.
5. **Vegetatively spreading:** (0) absent; (1) present.
6. **Roots stout, fleshy and bunched together:** (0) absent; (1) present, at least sometimes.
7. **Zig-zag branching pattern:** (0) absent; (1) present.
8. **Leaf position:** (0) alternate; (1) uppermost cauline leaves opposite.
9. **Leaf bases forming fibrous remains:** (0) absent; (1) present.
10. **First-formed leaves entire:** (0) absent; (1) present.
11. **First-formed leaves linear, entire:** (0) absent; (1) present.
12. **Adult leaves entire:** (0) absent, toothed or otherwise dissected; (1) present.
13. **Leaf lobes linear:** (0) absent; (1) present.
14. **Leaves 2-pinnatifid or 2-pinnatisect:** (0) absent; (1) present (at least some present).
15. **Leaves apically 3-lobed:** (0) absent (entire or otherwise lobed); (1) present.
16. **Leaves with rounded lobes along their length:** (0) absent (entire or lobes not occurring throughout the length of the leaf); (1) present.
17. **Leaf lamina dilated in the lower 1/3 to 1/2:** (0) absent (not dilated or dilated for less than 1/3 their length); (1) present.
18. **Leaf apex dilated:** (0) absent; (1) present.
19. **Leaves glaucous:** (0) absent; (1) present.
20. **Leaves 3-veined:** (0) absent; (1) present.
21. **Leaves overtopping capitula:** (0) absent; (1) present.
22. **Eglandular hairs on leaves coarse, cottony:** (0) absent; (1) present.
23. **Eglandular hairs on leaves with conical bases and apical flagellum:** (0) absent; (1) present.
24. **Eglandular hairs on leaves with a bifid apex:** (0) absent; (1) present.
25. **Mature capitula forming a solid head of fruit:** (0) absent; (1) present.
26. **Rows of bracts:** (0) Bracts in several rows, the outer bracts shorter than the inner; (1) bracts in one or almost two rows, but of approximately equal length or the inner bracts slightly smaller.
27. **Bract margins prominently and consistently dark purple:** (0) absent; (1) present.
28. **Bract epidermal cells large, thick-walled:** (0) absent; (1) present.
29. **Ratio of ray:disc florets:** (0) rays fewer; (1) rays more; (2) variable.
30. **Ray corolla colour:** (0) white, blue, pink; (1) yellow.
31. **Sexuality:** (0) bisexual; (1) male.
32. **Disc corolla lobe number:** (0) 5, or mainly so; (1) 4, or mainly so.
33. **Terminal appendage of styles of bisexual florets:** (0) shallowly deltate; (1) deltate; (2) widely deltate; (3) triangular; (4) narrowly triangular or somewhat lanceolate; (5) oblong or lanceolate-oblong.
34. **Anther terminal appendages:** (0) present; (1) absent.
35. **Dimorphic cypselas:** (0) absent (monomorphic); (1) present.
36. **Carpopodium:** (0) present; (1) absent.
37. **Peg-like base:** (0) absent; (1) present.
38. **Sclerenchymatous ribs:** (0) four or more; (2) absent or ab/adaxial margins only.
39. **Cypselas with at least some swelling on the lateral surfaces:** (0) absent; (1) present.
40. **Cypselas with a single, longitudinal ridge per lateral surface:** (0) absent; (1) present.
41. **Cypselas with two, non-vascular, longitudinal ridges per lateral surface:** (0) absent; (1) present.
42. **Cypselas with inversely u-shaped, non-vascular ridges:** (0) absent; (1) present.
43. **Cypselas radially extended:** (0) absent; (1) absent and present; (2) present.
44. **Cypselas lateral surfaces tuberculate:** (0) absent; (1) absent or present; (2) present.
45. **Cypselas lateral surfaces with central extension:** (0) absent; (1) present; (2) thin wings; (3) tuberculate wing.
46. **Cypselas ab/adaxially curved towards the central axis of the capitulum:** (0) absent; (1) present.
47. **Cypselas strongly curved at right angles to the radius:** (0) absent; (1) present.
48. **Cypselas lateral surfaces concave:** (0) absent (flat to convex); (1) present.
49. **Cypselas lateral surfaces tessellated:** (0) absent; (1) present.
50. **Cypselas surfaces minutely papillate:** (0) absent; (1) present.
51. **Cypselas with glabrous, apical cap:** (0) absent; (1) present.
52. **Cypselas ribs and margins differently coloured to body of fruit:** (0) absent (monocolorous); (1) present (discolorous).
53. **Cypselas charcoal black:** (0) absent (shades of brown, grey, purplish-black); (1) present.
54. **Cypselas grey:** (0) absent (shades of brown, purplish-black, charcoal black); (1) present.
55. **Cypselas viscid:** (0) absent; (1) present.
56. **Cypselas strongly reflexing at maturity:** (0) absent; (1) present.
57. **Eglandular hairs on cypselas:** present (0); absent (1).
58. **Biseriate hairs on cypselas weak, bifid:** (0) absent; (1) present.
59. **Biseriate hairs on cypselas long-forked:** (0) absent; (1) present.
60. **Biseriate hairs on cypselas somewhat curved, but not obviously bifid:** (0) absent; (1) present.
61. **Biseriate hairs on cypselas straight:** (0) absent; (1) present, not bifid; (2) bifid although not usually obvious.
62. **Biseriate hairs on cypselas apically-curved:** (0) absent; (1) present.
63. **Number of vascular traces in the pericarp:** (0) four or more; (1) two.
64. **Secretory canals in the pericarp:** (0) absent; (1) present.
65. **Pericarp sclerenchyma:** (0) absent; (1) present.
66. **Testa:** (0) u-shaped; (1) evenly thickened; (2) thin.
67. **Pappus:** (0) absent; (1) present (short); (2) present (papillose ring).
68. **Pollen:ovule ratios:** (0) greater than 1,000; (1) less than c. 500.
69. **Apomictic:** (0) absent; (1) present.
70. **Chromosome number  $n$  or  $x = 9$ :** (0) absent; (1) present.
71. **Chromosome number  $n$  or  $x = 8$ :** (0) absent; (1) present.
72. **Chromosome number  $n$  or  $x = 7$ :** (0) absent; (1) present.
73. **Chromosome number  $n$  or  $x = 6$ :** (0) absent; (1) present.
74. **Chromosome number  $n$  or  $x = 5$ :** (0) absent; (1) present.
75. **Chromosome number  $n$  or  $x = 4$ :** (0) absent; (1) present.
76. **Chromosome number  $n$  or  $x = 3$ :** (0) absent; (1) present.
77. **Chromosome number  $n = 2$ :** (0) absent; (1) present.

## Appendix 2. Morphological and other characteristics of species of *Allittia*, *Brachyscome* s.lat., *Hullsia*, *Pembertonia*, *Pytinicarpa* and *Roebuckia*

Taxon/Character	1	2	3	4	5	6	7	8	9	10	11	12
<b><i>Allittia</i></b>												
<i>A. cardiocarpa</i>	0	1	0	2	0	0	0	0	1	1	?	1
<i>A. uliginosa</i>	0	1	0	2	0	0	0	0	1	?	?	0
<b><i>Brachyscome</i></b>												
<i>Brachyscome aculeata</i> group												
<i>B. aculeata</i>	0	1	0	0	1	0	0	0	0	1	0	0
<i>B. ascendens</i>	0	1	0	0	1	0	0	0	0	?	?	0
<i>B. cuneifolia</i>	0	1	0	0	1	0	0	0	0	?	?	0
<i>B. riparia</i>	0	1	0	0	?	0	0	0	0	?	?	0
<i>B. spathulata</i>	0	1	0	0	1	0	0	0	0	0	0	0
<i>Brachyscome basaltica</i> group												
<i>B. basaltica</i>	0	1	0	0	1	0	0	0	0	1	?	1
<i>B. paludicola</i>	0	1	0	0	1	0	0	0	0	1	?	1
<i>B. nana</i>	1	1	0	0	0	0	0	0	0	1	?	1
<i>Brachystephium</i> group												
<i>B. castiana</i>	1	1	0	0	0	0	0	0	0	?	?	0
<i>B. diversifolia</i>	0	1	0	0	0,1	0	0	0	0	?	?	0
<i>B. goniocarpa</i>	1	1	0	0	0	0	0	0	0	1	0	0
<i>B. gracilis</i>	1	1	0	0	0	0	0	0	0	1	0	0
<i>B. nodosa</i>	1	1	0	0	0	0	0	0	0	0	0	0
<i>B. readeri</i>	1	1	0	0	0	0	0	0	0	?	?	0
<i>B. segmentosa</i>	0	?	0	0	1	0	0	0	0	?	?	0
<i>Brachyscome ciliaris</i> group												
<i>B. blackii</i>	0	0	1	0	0	0	0	0	0	?	?	0
<i>B. ciliaris</i> complex	0,1	1	0	0	0, ?1	0	0	0	0	?,1	?	0,1
<i>B. dalbyensis</i>	0	?	0	0	0	0	0	0	0	?	?	0
<i>B. glandulosa</i>	1	1	0	0	0	0	0	0	0	?	?	0
<i>B. parvula</i> complex	0	1	0	0	1	0	0	0	0	1	?	0,1
<i>B. perpusilla</i>	1	1	0	0	0	0	0	0	0	?	?	0
<i>B. rigidula</i>	0	?	0	0	?, 1	0	0	0	0	?	?	0
<i>B. rudallensis</i>	0	1	0	0	0	0	0	0	0	1	?	0
<i>B. tatei</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>B. tesquorum</i>	0	0	1	0	0	0	0	0	0	1	?	0
<i>B. trachycarpa</i>	0	0	1	0	0	0	0	0	0	1	?	0,1
<i>B. xanthocarpa</i>	1	1	0	0	0	0	0	0	0	?	?	0
<i>Brachyscome decipiens</i> group												
<i>B. decipiens</i>	0	1	0	1	?	1	0	0	0	?	0	0
<i>Brachyscome dentata</i> group												
<i>B. chrysoglossa</i>	0	1	0	0	0	0	0	0	0	0,1	?	0
<i>B. curvicarpa</i>	1	1	0	0	0	0	0	0	0	1	0	0
<i>B. debilis</i>	1	1	0	0	0	0	0	0	0	1	?	0
<i>B. dentata</i>	?	1	0	0	0	0	0	0	0	1	0	0
<i>B. georginensis</i>	1	1	0	0	0	0	0	0	0	?	?	0
<i>B. papillosa</i>	?	1	0	0	0	0	0	0	0	?	?	0
<i>B. tetrapterocarpa</i>	1	1	0	0	0	0	0	0	0	1	?	0
<i>Brachyscome iberidifolia</i> group												
<i>B. bellidioides</i>	1	1	0	0	0	0	?	0	0	1	?	1
<i>B. billabongensis</i>	1	1	0	0	0	0	1	0	0	1	1	0
<i>B. exilis</i>	1	1	0	0	0	0	?	0	0	1	?	0
<i>B. eyrensis</i>	1	1	0	0	0	0	?	0	0	?	?	0
<i>B. gilesii</i>	1	1	0	0	0	0	1	0	0	?	1	0
<i>B. iberidifolia</i> complex	1	1	0	0	0	0	?	0	0	1	?	0
<i>B. pusilla</i>	1	1	0	0	0	0	1	0	0	1	?	0
<i>B. simulans</i>	1	1	0	0	0	0	1	0	0	1	1	0
<i>Brachyscome lineariloba</i> group												
<i>B. breviscapis</i>	1	1	0	1	0	0	0	0	0	1	1	0
<i>B. campylocarpa</i>	1	1	0	0	0	0	0	0	0	1	1	0
<i>B. dichromosomatica</i>	1	1	0	0	0	0	0	0	0	1	1	0
<i>B. eriogona</i>	1	1	0	0	0	0	0	0	0	1	1	0
<i>B. lineariloba</i> 'B'	1	1	0	1	0	0	0	0	0	1	1	0
<i>B. lineariloba</i> 'C'	1	1	0	1	0	0	0	0	0	1	1	0
<i>B. smithwhitei</i>	1	1	0	0	0	0	0	0	0	1	1	0
<i>B. watanabei</i>	1	1	0	0	0	0	0	0	0	1	1	0
<i>Brachyscome muelleri</i> group												
<i>B. muelleri</i>	1	1	0	0	0	0	0	0	0	?	?	0
<i>B. muelleroides</i>	1	1	0	0	0	0	0	0	0	1	?	1
<i>B. pythocarpa</i>	?	1	0	1	0	0	0	0	0	1	?	0

Taxon/Character	1	2	3	4	5	6	7	8	9	10	11	12
<i>Brachyscome multifida</i> group												
<i>B. abercrombiensis</i>	0	1	0	0	?	0	0	0	0	?	?	0
<i>B. dissectifolia</i>	0	1	0	1	1	0	0	0	0	?	?	0
<i>B. melanocarpa</i>	?	1	0	0	0	0	0	0	0	1	0	0
<i>B. microcarpa</i> complex	0	1	0	0,1	1	0	0	1	0	0	0	0
<i>B. multifida</i> s.str.	0	0	0	0	1	0	0	0	0	1	?	0
<i>B. multifida</i> (Grampians)	0	0	0	0	1	0	0	0	0	0	0	0
<i>B. nova-anglica</i>	0	1	0	0	?	0	0	0	0	?	?	0
<i>B. stuartii</i>	0	1	0	1	0	0	0	0	0	1	?	0
<i>B. tamworthensis</i>	0	1	0	0	1	0	0	0	0	?	?	0
<i>B. trisecta</i>	0	1	0	0	1	0	0	0	0	?	?	0
<i>Brachyscome nivalis</i> group												
<i>B. barkerae</i>	0	1	0	2	1	0	0	0	0	?	?	0
<i>B. nivalis</i>	0	1	0	2	1	0	0	0	0	?	?	0
<i>B. radicans</i>	0	1	0	2	1	0	0	0	0	?	?	0
<i>B. stolonifera</i>	0	1	0	2	1	0	0	0	0	1	?	1
<i>B. tadgellii</i>	0	1	0	2	1	0	0	0	0	?	?	0
<i>B. walshii</i>	0	1	0	2	1	0	0	0	0	?	?	0
<i>Paquerina</i> group												
<i>B. elegans</i>	0	1	0	?	1	0	0	0	0	?	?	0
<i>B. foliosa</i>	0	1	0	2	1	0	0	0	0	?	0	0
<i>B. graminea</i>	0	1	0	0	1	0	0	0	0	1	?	1
<i>B. humilis</i>	0	1	0	1	1	0	0	0	?	?	?	0
<i>B. linearis</i>	0	1	0	1	1	0	0	0	0	?	?	0
<i>B. longiscapa</i>	0	1	0	1	1	?	0	0	?	1	?	0
<i>B. montana</i>	0	1	0	1	1	0	0	0	0	?	0	0
<i>B. obovata</i>	0	1	0	1,2	1	0	0	0	0	1	?	1
<i>B. papuana</i>	0	1	0	2	1	0	0	0	0	?	?	0
<i>B. pinnata</i>	0	1	0	1	1	0	0	0	?	?	?	0
<i>B. radicata</i>	0	1	0	0,2	1	0	0	0	0	1	?	0
<i>B. scapigera</i>	0	1	0	1,2	1	0	0	0	1	1	?	1
<i>B. sinclairii</i>	0	1	0	1	1	0	0	0	?	?	?	0
<i>B. staceae</i>	0	1	0	1	1	0	0	0	0	1	0	0
<i>B. tasmanica</i>	0	1	0	2	1	0	0	0	0	1	?	1
<i>B. tenuiscapa</i>	0	1	0	1,2	1	0	0	0	0	?	0	0
<i>Brachyscome triloba</i> group												
<i>B. brownii</i>	0	1	0	0	1	?	0	0	0	?	?	0
<i>B. formosa</i>	0	1	0	0	1	1	0	0	0	0	0	0
<i>B. kaputarensis</i>	0	1	0	0	1	?	0	0	0	?	?	0
<i>B. mittagongensis</i>	0	1	0	0	1	?	0	0	0	?	?	0
<i>B. petrophila</i>	0	1	0	0	1	?	0	0	0	?	0	0
<i>B. procumbens</i>	0	1	0	0	1	1	0	0	0	0	0	0
<i>B. saliciniæ</i>	0	1	0	0	1	?	0	0	0	?	?	0
<i>B. sieberi</i>	0	1	0	0	1	?	0	0	0	?	?	0
<i>B. triloba</i>	0	1	0	0	1	1	0	0	0	1	?	0/1
<i>B. willisii</i>	0	1	0	0	1	1	0	0	0	?	?	0
<i>Brachyscome whitei</i> group												
<i>B. whitei</i>	1	1	0	0	0	0	0	0	0	?	0	0
<i>Hullsia</i>												
<i>H. argillicola</i>	0	1	0	0	?	0	0	0	0	1	?	1
<i>Pembertonia</i>												
<i>P. latisqueamea</i>	0	0	0	0	0	0	0	0	0	1	?	1
<i>Pytinicarpa</i>												
<i>P. neocaledonica</i>	0	1	0	1	1	0	0	0	1	?	?	0
<i>P. sarassini</i>	0	1	0	1	1	0	0	0	1	?	?	0
<i>Roebuckia</i>												
<i>R. cheilocarpa</i>	1	1	0	0	0	0	0	0	0	0/1	0	0
<i>R. chinmockii</i>	1	1	0	0	0	0	?	0	0	1	1	0
<i>R. ciliocarpa</i>	1	1	0	0	0	0	?	0	0	?	1	0
<i>R. cuveata</i>	1	1	0	0	0	0	?	0	0	?	?	0
<i>R. balophila</i>	1	1	0	0	0	0	0	0	0	1	1	0
<i>R. lathamensis</i>	1	1	0	0	0	0	?	0	0	?	?	0
<i>R. nerrenensis</i>	1	1	0	0	0	0	0	0	0	1	?	0
<i>R. oncocarpa</i>	1	1	0	0	0	0	?	0	0	1	1	0
<i>R. similis</i>	1	1	0	0	0	0	?	0	0	1	1	0

Taxon/Character	13	14	15	16	17	18	19	20	21	22	23	24
<b>Allittia</b>												
<i>A. cardiocarpa</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>A. uliginosa</i>	0	0	0	0	0	0	0	0	0	1	0	0
<b>Brachyscome</b>												
<i>Brachyscome aculeata</i> group												
<i>B. aculeata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. ascendens</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. cuneifolia</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. riparia</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. spathulata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome basaltica</i> group												
<i>B. basaltica</i>	0	0	0	0	0	0	0, 1	?	0	0	0	0
<i>B. paludicola</i>	0	0	0	0	0	0	0	?	0	0	0	0
<i>B. rara</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brachystephium</i> group												
<i>B. castiana</i>	0	1	0	0	1	0	0	0	0	0	0	0
<i>B. diversifolia</i>	0	1	0	0	1	0	0	0	0	0	0	0
<i>B. goniocarpa</i>	0	0	0	0	1	0	0	0	?	0	0	0
<i>B. gracilis</i>	0	0	0	0	1	0	0	0	0	0	0	0
<i>B. nodosa</i>	0	1	0	0	1	0	0	0	0	0	0	0
<i>B. readeri</i>	0	0	0	0	?	0	0	0	0	0	0	0
<i>B. segmentosa</i>	0	1	0	0	?	0	0	0	0	0	0	0
<i>Brachyscome ciliaris</i> group												
<i>B. blackii</i>	0	1	0	0	0	0	0	0	0	0	0	0
<i>B. ciliaris</i> complex	0, 2	0, 1	0	0	0	0	0	0	0	0	0	0
<i>B. dalbyensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. glandulosa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. parvula</i> complex	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. perpusilla</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. rigidula</i>	0	0, 1	0	0	0	0	0	0	0	0	0	0
<i>B. rudallensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. tatei</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. tesquorum</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. trachycarpa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. xanthocarpa</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>Brachyscome decipiens</i> group												
<i>B. decipiens</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome dentata</i> group												
<i>B. chrysoglossa</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>B. curvica</i>	0	0	?	0	0	0	0	0	0	0	0	0
<i>B. debilis</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>B. dentata</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>B. georginensis</i>	0	0	?	0	0	0	0	0	0	0	0	0
<i>B. papillosa</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>B. tetrapterocarpa</i>	0	0	?	0	0	0	0	0	0	0	0	0
<i>Brachyscome iberidifolia</i> group												
<i>B. bellidioides</i>	0	0	0	0	0	1	0	0	0	0	0	0
<i>B. billabongensis</i>	1	0	0	0	0	1	0	0	0	0	0	0
<i>B. exilis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. eyrensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. gilesii</i>	1	0	0	0	0	1	0	0	0	0	0	0
<i>B. iberidifolia</i> complex	?, 1	0, 1	0	0	0	0, 1	0	0	0	0	0	0
<i>B. pusilla</i>	1	0	0	0	0	1	0	0	0	0	0	0
<i>B. simulans</i>	1	0	0	0	0	1	0	0	0	0	0	0
<i>Brachyscome lineariloba</i> group												
<i>B. breviscapis</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. campylocarpa</i>	1	1	0	0	0	0	0	0	0	0	0	0
<i>B. dichromosomatica</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>B. eriogona</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>B. lineariloba</i> 'B'	1	0	0	0	0	0	0	0	0	0	0	0
<i>B. lineariloba</i> 'C'	1	0	0	0	0	0	0	0	0	0	0	0
<i>B. smithwhitei</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>B. watanabei</i>	1	1	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome muelleri</i> group												
<i>B. muelleri</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. muelleroides</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. ptychocarpa</i>	1	0	0	0	0	0	0	0	0	0	0	0

Taxon/Character	13	14	15	16	17	18	19	20	21	22	23	24
<i>Brachyscome multifida</i> group												
<i>B. abercrombiensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. dissectifolia</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. melanocarpa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. microcarpa</i> complex	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. multifida</i> s.str.	1	1	0	0	0	0	0	0	0	0	0	0
<i>B. multifida</i> (Grampians)	0	1	0	0	0	0	0	0	0	0	0	0
<i>B. nova-anglica</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. stuartii</i>	0	1	0	0	?	0	0	0	0	0	0	0
<i>B. tamworthensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. trisecta</i>	0	1	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome nivalis</i> group												
<i>B. barkerae</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. nivalis</i>	0	1	0	0	0	0	0	0	0	0	0	0
<i>B. radicans</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. stolonifera</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. tadgellii</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. walshii</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Paquerina</i> group												
<i>B. elegans</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. foliosa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. graminea</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. humilis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. linearis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. longiscapa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. montana</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. obovata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. papuana</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. pinnata</i>	0	0	0	1	0	0	0	0	0	0	0	0
<i>B. radicata</i>	0	0	0	0	0	0	0	0	0	0	0.1	0
<i>B. scapigena</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. sinclairii</i>	0	0	0	1	0	0	0	0	0	0	0	0
<i>B. staceae</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. tasmanica</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. tenuiscapa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome triloba</i> group												
<i>B. brownii</i>	0	0	0.1	0	0	0	0	0	0	0	0	0
<i>B. formosa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. kaputarensis</i>	0	0	0.1	0	0	0	0	0	0	0	0	0
<i>B. mittagongensis</i>	0	0	0.1	0	0	0	0	0	0	0	0	0
<i>B. petrophila</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. procumbens</i>	0	0.1	0	0	0	0	0	0	0	0	0	0
<i>B. salkiniae</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. sieberi</i>	0	0	0.1	0	0	0	0	0	0	0	0	0
<i>B. triloba</i>	0	0	0.1	0	0	0	0	0	0	0	0	0
<i>B. willisii</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome whitei</i> group												
<i>B. whitei</i>	0	0	0	0	0	0	0	0	0	0	0	0
<b>Hullsia</b>												
<i>H. argillicola</i>	0	0	0	0	0	0	1	1	0	0	0	0
<b>Pembertonia</b>												
<i>P. latisquamata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<b>Pytinicarpa</b>												
<i>P. neocaledonica</i>	0	0	0	0	0	0	0	?	0	1	0	0
<i>P. sarassini</i>	0	0	0	0	0	0	0	?	0	1	0	0
<b>Roebuckia</b>												
<i>R. cheilocarpa</i>	1	1	0	0	0	0	0	0	0	0	0	0
<i>R. chinmockii</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>R. ciliocarpa</i>	1	1	0	0	0	0	0	0	0	0	0	0
<i>R. cuneata</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>R. halophila</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>R. lathamensis</i>	0	1	0	0	0	?	0	0	0	0	0	0
<i>R. nerrenensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>R. oncocarpa</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>R. similis</i>	1	1	0	0	0	0	0	0	0	0	0	0

Taxon/Character	25	26	27	28	29	30	31	32	33	34	35	36
<b>Allittia</b>												
<i>A. cardiocarpa</i>	0	0	0	0	0	0	0	0	3	0	0	0
<i>A. uliginosa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<b>Brachyscome</b>												
<i>Brachyscome aculeata</i> group												
<i>B. aculeata</i>	0	1	0	0	0	0	0	0	2	0	0	0
<i>B. ascendens</i>	0	1	0	0	?	0	0	0	?	0	0	0
<i>B. cuneifolia</i>	0	1	0	0	0	0	0	0	1	0	0	0
<i>B. riparia</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. spatulata</i>	0	1	0	0	0	0	0	0	1	0	0	0
<i>Brachyscome basaltica</i> group												
<i>B. basaltica</i>	0	1	0	0	0	0	0	0	?	0	0	0
<i>B. paludicola</i>	0	1	0	0	0	0	0	0	?	0	0	0
<i>B. rara</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>Brachystephium</i> group												
<i>B. castiana</i>	1	1	0	0	0	0	0	0	3	0	0	1
<i>B. diversifolia</i>	1	1	0	0	0	0	0	0	4	0	0	1
<i>B. goniocarpa</i>	1	1	0	0	0	0	0	1	3	0	0	1
<i>B. gracilis</i>	1	1	0	0	0	0	0	0	3	0	0	1
<i>B. nodosa</i>	1	1	0	0	0	0	0	0	2	0	0	1
<i>B. readeri</i>	1	1	0	0	2	0	0	0	3	0	0	1
<i>B. segmentosa</i>	1	1	0	0	?	0	0	0	3	0	0	1
<i>Brachyscome ciliaris</i> group												
<i>B. blackii</i>	0	1	0	0	?	0	0	0	3,4	0	0	0
<i>B. ciliaris</i> complex	0	1	0	0	0,2	0	0	0	3,4	?,1	0,1	0
<i>B. dalbyensis</i>	0	1	0	0	?	0	0	0	4	1	0	0
<i>B. glandulosa</i>	0	1	0	0	2	0	0	0	3	1	0	0
<i>B. parvula</i> complex	0	1	0	0	?	0	0	0	3,4	1	0	0
<i>B. perpusilla</i>	0	1	0	0	2	0	0	0	3	?	0	0
<i>B. rigidula</i>	0	1	0	0	?	0	0	0	4	?	0	0
<i>B. rudallensis</i>	0	1	0	0	?	0	0	0	4	1	1	0
<i>B. tatei</i>	0	1	0	0	0	0	0	0	4	?	0	0
<i>B. tesquorum</i>	0	1	0	0	?	0	0	0	3	0	0	0
<i>B. trachycarpa</i>	0	1	0	0	0	0	0	0	3	?	0	0
<i>B. xanthocarpa</i>	0	1	0	0	0	0	0	0	3	0,1	0	0
<i>Brachyscome decipiens</i> group												
<i>B. decipiens</i>	0	0	0	0	0	0	0	0	2,3	0	0	0
<i>Brachyscome dentata</i> group												
<i>B. chrysoglossa</i>	0	1	0	0	0	1	0	0	4	0	0	0
<i>B. curvica</i>	0	1	0	0	0	1	0	0	3	0	0	0
<i>B. debilis</i>	0	1	0	0	0	1	0	0	3	0	1	0
<i>B. dentata</i>	0	1	0	0	0	1	0	0	3	0	0	0
<i>B. georginensis</i>	0	1	0	0	0	?	0	0	3	0	0	0
<i>B. papillosa</i>	0	1	0	0	0	?	0	0	3	0	0	0
<i>B. tetrapterocarpa</i>	0	1	0	0	0	1	0	0	2	0	0	0
<i>Brachyscome iberidifolia</i> group												
<i>B. bellidioides</i>	0	1	0	0	?	0	0	0	?	1	0	0
<i>B. billabongensis</i>	0	1	0	0	0	0	0	0	5	1	0	0
<i>B. exilis</i>	0	1	0	0	2	0	0	0	4	1	0	0
<i>B. eyrensis</i>	0	1	0	0	?	0	0	0	4	1	0	0
<i>B. gilesii</i>	0	1	0	0	0	0	0	0	5	1	0	?
<i>B. iberidifolia</i> complex	0	1	0	0	0	0	0	0	?	1	0	0
<i>B. pusilla</i>	0	1	0	0	?	0	0	0	3	1	0	0
<i>B. simulans</i>	0	1	0	0	0	0	0	0	5	1	0	?
<i>Brachyscome lineariloba</i> group												
<i>B. breviscapis</i>	1	1	0	0	2	0	0	0,1	2	?	0	1
<i>B. campylocarpa</i>	1	1	0	0	0	0	0	0	3	0	0	1
<i>B. dichromasomatica</i>	1	1	0	0	0	0	0	0	3,4	0	0	1
<i>B. eriogona</i>	1	1	0	0	0	0	0	0	3	0	0	1
<i>B. lineariloba</i> 'B'	1	1	0	0	0	0	0	0	2	0	0	1
<i>B. lineariloba</i> 'C'	1	1	0	0	2	0	0	0	2	0	0	1
<i>B. smithwhitei</i>	1	1	0	0	0	0	0	0	3	0	0	1
<i>B. watanabei</i>	1	1	0	0	0	0	0	0	1	0	0	1
<i>Brachyscome muelleri</i> group												
<i>B. muelleri</i>	0	1	0	0	2	0	0	0	3	0	0	0
<i>B. muelleroides</i>	0	1	0	0	1	0	0	0	3	0	0	0
<i>B. ptychocarpa</i>	0	1	0	0	0	0	0	0	3	0	0	0

Taxon/Character	25	26	27	28	29	30	31	32	33	34	35	36
<i>Brachyscome multifida</i> group												
<i>B. abercrombiensis</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. dissectifolia</i>	0	1	0	0	0	0	0	0	3	?	0	0
<i>B. melanocarpa</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. microcarpa</i> complex	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. multifida</i> s.str.	0	1	0	0	0	0	0	0	2	0	0	0
<i>B. multifida</i> (Grampians)	0	1	0	0	0	0	0	0	0	0	0	0
<i>B. nova-anglica</i>	0	1	0	0	0	0	0	0	2	0	0	0
<i>B. stuartii</i>	0	1	0	0	?	0	0	0	3	0	0	0
<i>B. tamworthensis</i>	0	1	0	0	2	0	0	0	2	0	0	0
<i>B. trisecta</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>Brachyscome nivalis</i> group												
<i>B. barkerae</i>	0	1	0	1	?	0	0	0	3	0	0	0
<i>B. nivalis</i>	0	1	0	1	?	0	0	0	3	0	0	0
<i>B. radicans</i>	0	1	0	0	0	0	0	0	3	0	0	0,1
<i>B. stolonifera</i>	0	1	0	1	?	0	0	0	3	0	0	0
<i>B. tadgellii</i>	0	1	0	1	?	0	0	0	3	0	0	1
<i>B. walshii</i>	0	1	0	1	?	0	0	0	3	0	0	0
<i>Paquerina</i> group												
<i>B. elegans</i>	0	1	0	0	0	0	0	0	?	0	0	?
<i>B. foliosa</i>	0	1	0	0	?	0	0	0	1	0	0	0
<i>B. graminea</i>	0	1	0	0	0	0	0	0	0	0	0	1
<i>B. humilis</i>	0	1	1	0	?	0	0	0	?	0	0	0
<i>B. linearis</i>	0	1	1	0	1	0	0	1	?	0	0	0
<i>B. longiscapa</i>	0	1	0	0	?	0	0	0	?	0	0	0
<i>B. montana</i>	0	1	0	0	?	0	0	0	3	0	0	0
<i>B. obovata</i>	0	1	0	0	?	0	0	0	4	0	0	0
<i>B. papuana</i>	0	1	0	0	?	1	0	0	?	0	0	0
<i>B. pinnata</i>	0	1	0	0	?	0	0	0	?	0	0	0
<i>B. radicata</i>	0	1	0	0	?	0	0	0	3	0	0	0
<i>B. scapigena</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. sinclairii</i>	0	1	0	0	?	0	0	0	?	0	0	0
<i>B. staceae</i>	0	1	0	0	?	0	0	0	3	0	0	0
<i>B. tasmanica</i>	0	1	0	0	?	0	0	0	3	0	0	0
<i>B. tenuiscapa</i>	0	1	0	0	?	0	0	0	2	0	0	0
<i>Brachyscome triloba</i> group												
<i>B. brownii</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. formosa</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. kaputarensis</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. mittagongensis</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. petrophila</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. procumbens</i>	0	1	0	0	0	0	0	0	2,3	0	0	0
<i>B. salkiniae</i>	0	1	0	0	0	0	0	0	2	0	0	0
<i>B. sieberi</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. triloba</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>B. willisii</i>	0	1	0	0	0	0	0	0	3	0	0	0
<i>Brachyscome whitei</i> group												
<i>B. whitei</i>	?	1	0	0	0	0	0	0	0,2	0	0	0
<b>Hullsia</b>												
<i>H. argillicola</i>	0	0	0	0	?	0	1	0	-	0	0	0
<b>Pembertonia</b>												
<i>P. latisquamata</i>	0	0	0	0	0	0	0	0	5	1	0	0
<b>Pytinicarpa</b>												
<i>P. neocaledonica</i>	0	0	0	0	?	0	1	0	-	0	0	0
<i>P. sarassini</i>	0	0	0	0	?	0	1	0	-	0	0	0
<b>Roebuckia</b>												
<i>R. cheilocarpa</i>	1	1	0	0	0	0	0	0	5	1	0	0
<i>R. chinmockii</i>	?	1	0	0	?	0	0	0	5	1	0	0
<i>R. ciliocarpa</i>	1	1	0	0	0	0	0	0	5	1	0	0
<i>R. cuneata</i>	?	1	0	0	0	0	0	0	5	1	0	0
<i>R. halophila</i>	1	1	0	0	0	0	0	0	5	1	0	?
<i>R. latbamensis</i>	1	1	0	0	0	0	0	0	4,5	1	0	?
<i>R. nerrenensis</i>	?	1	0	0	0	0	0	0	5	1	0	?
<i>R. oncocarpa</i>	1	1	0	0	0	0	0	0	5	1	0	1
<i>R. similis</i>	1	1	0	0	0	0	0	0	5	1	0	0



Taxon/Character	37	38	39	40	41	42	43	44	45	46	47	48
<b>Allittia</b>												
<i>A. cardiocarpa</i>	0	0	0	0	0	0	2	0	0	0	0	0
<i>A. uliginosa</i>	0	0	0	0	0	0	2	0	0	0	0	0
<b>Brachyscome</b>												
<i>Brachyscome aculeata</i> group												
<i>B. aculeata</i>	0	0	0	0	0	0	2	?	0	0	0	0
<i>B. ascendens</i>	0	0	0	0	0	0	2	?	0	0	0	0
<i>B. cuneifolia</i>	0	0	0	0	0	0	2	?	0	0	0	0
<i>B. riparia</i>	0	0	0	0	0	0	2	?	0	0	0	0
<i>B. spathulata</i>	0	0	0	0	0	0	2	?	0	0	0	0
<i>Brachyscome basaltica</i> group												
<i>B. basaltica</i>	0	0	0	0	?	0	0	2	0	0	0	0
<i>B. paludicola</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>B. rara</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>Brachystephium</i> group												
<i>B. cassiana</i>	1	0	1	0	0	1	0	2	0	1	0	0
<i>B. diversifolia</i>	1	0	1	0	0	1	0	2	0	?	0	0
<i>B. goniocarpa</i>	1	0	1	0	0	1	0	2	0	1	0	0
<i>B. gracilis</i>	1	0	1	0	0	1	0	2	0	1	0	0
<i>B. nodosa</i>	1	0	1	0	0	1	0	2	0	1	0	0
<i>B. readeri</i>	1	0	1	0	0	1	0	2	0	0	0	0
<i>B. segmentosa</i>	1	0	1	0	0	1	0	0	0	0	0	0
<i>Brachyscome ciliaris</i> group												
<i>B. blackii</i>	0	0	0	0	0	0	0	2	0	0	0	0
<i>B. ciliaris</i> complex	0	0	0	0	0	0	0,1,2	0,1,2	0	0	0,1	0
<i>B. dalbyensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. glandulosa</i>	0	0	0	0	0	0	2	0	0	0	0	0
<i>B. parvula</i> complex	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. perpusilla</i>	0	0	0	0	0	0	2	0	0	0	0	0
<i>B. rigidula</i>	0	0	0	0	0	0	2	1	0	0	0	0
<i>B. rudallensis</i>	0	0	0	0	0	0	1	1	0	0	0	0
<i>B. tatei</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. tesquorum</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>B. trachycarpa</i>	0	0	0	0	0	0	0	2	0	0	0	0
<i>B. xanthocarpa</i>	0	0	0	0	0	0	0	2	0	0	0	0
<i>Brachyscome decipiens</i> group												
<i>B. decipiens</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome dentata</i> group												
<i>B. chrysoglossa</i>	0	0	0	0	0	0	2	0	0	0	0,1	0
<i>B. curvicaarpa</i>	0	0	0	0	0	0	2	2	?	0	1	0
<i>B. debilis</i>	0	0	0	0	0	0	1	0	0	0	0	0
<i>B. dentata</i>	0	0	0	0	0	0	2	2	0	0	0	0
<i>B. georginensis</i>	0	0	0	0	0	0	2	0	0	0	1	0
<i>B. papillosa</i>	0	0	0	0	0	0	2	2	0	0	0	0
<i>B. tetrapterocarpa</i>	0	0	0	0	0	0	2	0	2	0	1	0
<i>Brachyscome iberidifolia</i> group												
<i>B. bellidioides</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. billabongensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. exilis</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>B. eyrensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. gilesii</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. iberidifolia</i> complex	0	0	0,1	0	0	0	0	0	0	0	0	1
<i>B. pusilla</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. simulans</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome lineariloba</i> group												
<i>B. breviscapis</i>	1	0	1	1	0	0	0	0	0	0	0	0
<i>B. campylocarpa</i>	1	0	1	1	0	0	0	0	0	1	0	0
<i>B. dichromasomatica</i>	1	0	1	1	0	0	0	0	0	0	0	0
<i>B. eriogona</i>	1	0	1	1	0	0	0	0	0	1	0	0
<i>B. lineariloba</i> 'B'	1	0	1	1	0	0	0	0	0	0	0	0
<i>B. lineariloba</i> 'C'	1	0	1	1	0	0	0	0	0	0	0	0
<i>B. smithwhitei</i>	1	0	1	1	0	0	0	0	0	1	0	0
<i>B. watanabei</i>	1	0	1	1	0	0	0	0	0	1	0	0
<i>Brachyscome muelleri</i> group												
<i>B. muelleri</i>	0	0	0	0	1	0	2	0	1	0	1	0
<i>B. muelleroides</i>	0	0	0	0	1	0	2	0	1	0	1	0
<i>B. ptychocarpa</i>	0	0	0	0	1	0	2	0	1	0	1	0

Taxon/Character	37	38	39	40	41	42	43	44	45	46	47	48
<i>Brachyscome multifida</i> group												
<i>B. abercrombiensis</i>	0	0	0	0	0	0	0	2	0	0	0	0
<i>B. dissectifolia</i>	0	0	0	0	1	0	2	2	0	0	0	0
<i>B. melanocarpa</i>	0	0	0	0	0	0	0	2	0	0	0	0
<i>B. microcarpa</i> complex	0	0	0	0	0	0	0	2	0	0	0	0
<i>B. multifida</i> s.str.	0	0	0	0	0	0	0	2	0	0	0	0
<i>B. multifida</i> (Grampians)	0	0	0	0	0	0	0	2	0	0	0	0
<i>B. nova-anglica</i>	0	0	0	0	0	0	0	2	0	0	0	0
<i>B. stuartii</i>	0	0	0	0	1	0	2	2	0	0	0	0
<i>B. tamworthensis</i>	0	0	0	0	0	0	0	2	0	0	0	0
<i>B. trisecta</i>	0	0	0	0	0	0	0	2	0	0	0	0
<i>Brachyscome nivalis</i> group												
<i>B. barkerae</i>	0	0	0	0	1	0	2	2	1	0	0	0
<i>B. nivalis</i>	0	0	0	0	1	0	2	2	1	0	0	0
<i>B. radicans</i>	0	0	0	0	1	0	2	2	1	0	0	0
<i>B. stolonifera</i>	0	0	0	0	1	0	?	?	1	0	0	0
<i>B. tadgellii</i>	0	0	0	0	1	0	2	?	1	0	0	0
<i>B. walshii</i>	0	0	0	0	1	0	2	2	1	0	0	0
<i>Paquerina</i> group												
<i>B. elegans</i>	?	0	0	0	0	0	0	0	0	0	0	0
<i>B. foliosa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. graminea</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>B. humilis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. linearis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. longiscapa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. montana</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. obovata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. papuana</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. pinnata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. radicata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. scapigena</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. sinclairii</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. staceae</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. tasmanica</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. tenuiscapa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome triloba</i> group												
<i>B. brownii</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>B. formosa</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>B. kaputarensis</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>B. mittagongensis</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>B. petrophila</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>B. procumbens</i>	0	0	0	0	1	0	2	2	0	0	0	0
<i>B. salkiniae</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>B. sieberi</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>B. triloba</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>B. willisii</i>	0	0	0	0	1	0	0	2	0	0	0	0
<i>Brachyscome whitei</i> group												
<i>B. whitei</i>	0	0	1	0	0	1	2	0	3	0	0	0
<i>Hullsia</i>												
<i>H. argillicola</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Pembertonia</i>												
<i>P. latisquamata</i>	0	0	0	0	0	0	2	0	0	0	0	0
<i>Pytinicarpa</i>												
<i>P. neocaledonica</i>	0	1	0	0	0	0	0	0	0	0	0	0
<i>P. sarassini</i>	0	1	0	0	0	0	0	0	0	0	0	0
<i>Roebackia</i>												
<i>R. cheilocarpa</i>	0	0	1	0	0	1	2	2	0	0	0	0
<i>R. chinmockii</i>	0	0	1	0	0	1	0	0	0	0	0	0
<i>R. ciliocarpa</i>	0	0	1	0	0	1	0	0	0	0	0	0
<i>R. cuneata</i>	1	0	1	0	0	1	0	0	0	0	0	0
<i>R. halophila</i>	0	0	1	0	0	1	0	2	0	0	0	0
<i>R. latbamensis</i>	1	0	1	0	0	1	0	0	0	0	0	0
<i>R. nerrenensis</i>	1	0	1	0	0	1	0	0	0	0	0	0
<i>R. oncocarpa</i>	0	0	1	0	0	1	0	0	0	0	0	0
<i>R. similis</i>	0	0	1	0	0	1	0	0	0	0	0	0

Taxon/Character	49	50	51	52	53	54	55	56	57	58	59	60
<b>Allittia</b>												
<i>A. cardiocarpa</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>A. uliginosa</i>	0	0	0	0	0	0	0	0	0	0	0	1
<b>Brachyscome</b>												
<i>Brachyscome aculeata</i> group												
<i>B. aculeata</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. ascendens</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. cuneifolia</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. riparia</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. spathulata</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>Brachyscome basaltica</i> group												
<i>B. basaltica</i>	0	0	0	0	0	0	0	0	0	0	0	?
<i>B. paludicola</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. rara</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>Brachystephium</i> group												
<i>B. cassiana</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. diversifolia</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. goniocarpa</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. gracilis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. nodosa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. readeri</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. segmentosa</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>Brachyscome ciliaris</i> group												
<i>B. blackii</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. ciliaris</i> complex	0	0,1	0	1	0	0	0	0	0	0	0	0
<i>B. dalbyensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. glandulosa</i>	0	0	0	?	0	0	0	0	0	0	0	0
<i>B. parvula</i> complex	0	1	0	1	0	0	0	0	0	0	0	0
<i>B. perpusilla</i>	0	0	0	?	0	0	0	0	0	0	0	0
<i>B. rigidula</i>	0	0	0	?	0	0	0	0	0	0	0	1
<i>B. rudallensis</i>	0	1	0	0,1	0	0	0	0	0	0	0	0
<i>B. tatei</i>	0	0	0	1	0	0	0	0	0	0	0	0
<i>B. tesquorum</i>	0	0	0	?	0	0	0	0	0	0	0	0
<i>B. trachycarpa</i>	0	0	0	?	0	0	0	0	0	0	0	1
<i>B. xanthocarpa</i>	0	1	0	1	0	0	0	0	0	0	0	1
<i>Brachyscome decipiens</i> group												
<i>B. decipiens</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Brachyscome dentata</i> group												
<i>B. chrysoglossa</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. curvica</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. debilis</i>	0	1	0	0	0	0	0	1	0	0	0	0
<i>B. dentata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. georginensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. papillosa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. tetrapterocarpa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome iberidifolia</i> group												
<i>B. bellidioides</i>	1	1	0	0	0	1	0	0	1	0	0	0
<i>B. billabongensis</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>B. exilis</i>	0	1	0	0	0	1	0	1	0	0	0	1
<i>B. eyrensis</i>	0	1	0	0	0	1	0	?	0	0	0	1
<i>B. gilesii</i>	0	?	1	0	0	0	0	0	0	0	0	0
<i>B. iberidifolia</i> complex	0	1	0	0	0	1	0	1	0	0	0	0
<i>B. pusilla</i>	0	1	0	0	0	1	0	1	0	0	0	0
<i>B. simulans</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>Brachyscome lineariloba</i> group												
<i>B. breviscapis</i>	0	1	0	0	0	0	0	0	0	0	0	0
<i>B. campylocarpa</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. dichromasomatica</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. eriogona</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. lineariloba</i> 'B'	0	1	0	0	0	0	0	0	0	0	0	0
<i>B. lineariloba</i> 'C'	0	1	0	0	0	0	0	0	0	0	0	0
<i>B. smithwhitei</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. watanabei</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Brachyscome muelleri</i> group												
<i>B. muelleri</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. muelleroides</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. ptychocarpa</i>	0	0	0	?	0	0	0	0	0	0	0	0

Taxon/Character	49	50	51	52	53	54	55	56	57	58	59	60
<i>Brachyscome multifida</i> group												
<i>B. abercrombiensis</i>	0	0	0	0	?	0	0	?	0	0	0	1
<i>B. dissectifolia</i>	0	0	0	?	1	0	0	0	0	0	0	0
<i>B. melanocarpa</i>	0	1	0	0	1	0	0	0	0	0	0	1
<i>B. microcarpa</i> complex	0	0	0	0	1	0	0	0	0	0	0	1
<i>B. multifida</i> s.str.	0	0	0	0	1	0	0	0	0	0	1	0
<i>B. multifida</i> (Grampians)	0	0	0	0	1	0	0	0	0	0	0	1
<i>B. nova-anglica</i>	0	0	0	0	1	0	0	0	0	0	0	1
<i>B. stuartii</i>	0	0	0	?	1	0	0	0	0	0	0	0
<i>B. tamworthensis</i>	0	0	0	0	1	0	0	0	0	0	0	1
<i>B. trisecta</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>Brachyscome nivalis</i> group												
<i>B. barkerae</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. nivalis</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. radicans</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. stolonifera</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. tadgellii</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. walshii</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>Paquerina</i> group												
<i>B. elegans</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. foliosa</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. graminea</i>	0	0	0	0	0	0	1	0	1	0	0	0
<i>B. humilis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. linearis</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. longiscapa</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. montana</i>	0	0	0	0	0	0	0	?	1	0	0	0
<i>B. obovata</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. papuana</i>	0	0	0	0	0	0	1	0	1	0	0	0
<i>B. pinnata</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. radicata</i>	0	0	0	0	0	0	1	?	1	0	0	0
<i>B. scapigena</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. sinclairii</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. staceae</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>B. tasmanica</i>	0	0	0	1	0	0	0	0	0	0	0	1
<i>B. tenuiscapa</i>	0	0	0	0	0	0	0	0	1	0	0	0
<i>Brachyscome triloba</i> group												
<i>B. brownii</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. formosa</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. kaputarensis</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. mittagongensis</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. petrophila</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. procumbens</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. salkiniae</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. sieberi</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. triloba</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>B. willisii</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>Brachyscome whitei</i> group												
<i>B. whitei</i>	0	?	0	0	0	0	0	0	0	0	0	0
<b>Hullsia</b>												
<i>H. argillicola</i>	0	0	0	0	0	0	0	0	1	0	0	0
<b>Pembertonia</b>												
<i>P. latisqueamea</i>	0	0	0	0	0	0	0	0	1	0	0	0
<b>Pytinicarpa</b>												
<i>P. neocaledonica</i>	0	0	0	?	0	0	0	?	1	0	0	0
<i>P. sarassini</i>	0	0	0	?	0	0	0	?	1	0	0	0
<b>Roebuckia</b>												
<i>R. cheilocarpa</i>	0	?	0	0	0	0	0	0	0	0	0	0
<i>R. chinnockii</i>	0	1	0	0	0	0	0	?	0	0	0	0
<i>R. cillocarpa</i>	0	?	0	0	0	0	0	0	0	0	0	0
<i>R. cuneata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>R. halophila</i>	0	1	0	0	0	0	0	1	0	0	0	0
<i>R. latbamensis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>R. nerrenensis</i>	0	1	0	0	0	0	0	?	0	0	0	0
<i>R. oncocarpa</i>	0	?	0	0	0	0	0	0	0	0	0	0
<i>R. similis</i>	0	0,1	0	0	0	0	0	0	0	0	0	0

Taxon/Character	61	62	63	64	65	66	67	68	69	70	71	72
<b>Allittia</b>												
<i>A. cardiocarpa</i>	0	0	1	0	0	0	1	0	0	1	0	0
<i>A. uliginosa</i>	0	?	1	0	0	1	1	0	0	1	0	0
<b>Brachyscome</b>												
<i>Brachyscome aculeata</i> group												
<i>B. aculeata</i>	0	0	1	0	1	1	1	0	0	1	0	0
<i>B. ascendens</i>	0	0	1	0	?	?	1	0	0	?	?	?
<i>B. cuneifolia</i>	0	0	1	0	?	?	1	0	0	1	0	0
<i>B. riparia</i>	0	0	1	0	1	1	1	0	0	1	0	0
<i>B. spathulata</i>	0	0	1	0	?	0	1	0	0	1	0	0
<i>Brachyscome basaltica</i> group												
<i>B. basaltica</i>	0	0	1	0	?	?	2	0	0	0	1	0
<i>B. paludicola</i>	0	0	1	0	0	0	2	0	0	0	0	0
<i>B. rara</i>	0	0	1	0	0	0	2	0	0	0	0	0
<i>Brachystephium</i> group												
<i>B. castiana</i>	0	0	1	?	?	?	1	0	0	?	?	?
<i>B. diversifolia</i>	0	0	?	?	1	2	1	0	0	0	0	0
<i>B. goniocarpa</i>	0	0	?	0	1	2	1	1	0	0	0	0
<i>B. gracilis</i>	0	1	1	0	1	2	1	0	0	0	0	0
<i>B. nodosa</i>	0	1	1	0	1	2	1	0	0	0	0	0
<i>B. readeri</i>	0	0	1	0	?	2	1	0	0	0	0	0
<i>B. segmentosa</i>	0	0	?	?	?	?	1	0	0	?	?	?
<i>Brachyscome ciliaris</i> group												
<i>B. blackii</i>	0	1	?	0	0	0	0	0	0	?	?	?
<i>B. ciliaris</i> complex	0	1	1	0	0	0	0,1	?	0,1	1	0	0
<i>B. dalbyensis</i>	1	1	1	0	?	?	1	—	1	1	0	0
<i>B. glandulosa</i>	0	1	1	0	?	?	0	1	0	1	0	0
<i>B. parvula</i> complex	0	1	1	0	?	2	0,1	0	0,1	1	0	0
<i>B. perpusilla</i>	0	1	1	0	0	0	0	1	0	1	0	0
<i>B. rigidula</i>	0	0	1	0	1	1	1	0	0	1	0	0
<i>B. rudallensis</i>	0	1	1	0	?	?	1	—	1	?	?	?
<i>B. tatei</i>	0	1	1	0	1	0	1	0	0	1	0	0
<i>B. tesquorum</i>	0	1	1	0	0	0	0	0	0	1	0	0
<i>B. trachycarpa</i>	0	1	1	0	1	0	1	—	1	1	0	0
<i>B. xanthocarpa</i>	0	1	1	0	0	1	1	0	0	1	0	0
<i>Brachyscome decipiens</i> group												
<i>B. decipiens</i>	0	0	1	0	?	1	1	0	0	1	0	0
<i>Brachyscome dentata</i> group												
<i>B. chrysoglossa</i>	0	1	1	0	1	2	1	0	0	0	0	0
<i>B. curvica</i>	0	1	1	0	1	0	1	0	0	0	0	0
<i>B. debilis</i>	0	1	1	0	0	1	1	0	0	0	0	0
<i>B. dentata</i>	0	1	1	0	1	1	1	0	0	0	0	0
<i>B. georginensis</i>	0	1	1	0	?	?	1	0	0	?	?	?
<i>B. papillosa</i>	0	1	1	0	1	1	1	0	0	0	0	0
<i>B. tetrapterocarpa</i>	0	1	1	0	1	0	1	0	0	0	0	0
<i>Brachyscome iberidifolia</i> group												
<i>B. bellidioides</i>	0	0	1	0	?	?	?	0	0	1	0	0
<i>B. billabongensis</i>	2	0	1	0	?	?	0	0	0	1	0	0
<i>B. exilis</i>	0	0	1	0	1	0	0	0	0	1	0	0
<i>B. eyrensis</i>	0	0	1	0	1	0	0	0	0	?	?	?
<i>B. gilesii</i>	2	0	1	0	?	?	0	0	0	1	0	0
<i>B. iberidifolia</i> complex	0	1	1	0	0,1	2	0,1	0	0	1	0	0
<i>B. pusilla</i>	0	1	1	0	0	?	0	0	0	1	0	0
<i>B. simulans</i>	2	0	1	0	?	?	1	0	0	?	?	?
<i>Brachyscome lineariloba</i> group												
<i>B. breviscapis</i>	0	1	0	0	1	2	1	1	0	0	0	0
<i>B. campylocarpa</i>	0	1	0	0	1	2	1	0	0	0	0	0
<i>B. dichromasomatica</i>	0	1	0	0	1	2	1	0	0	0	0	0
<i>B. eriogona</i>	0	1	0	0	1	2	1	0	0	0	0	0
<i>B. lineariloba</i> 'B'	0	1	?	0	1	2	1	1	0	0	0	0
<i>B. lineariloba</i> 'C'	0	1	0	0	1	2	1	1	0	0	1	0
<i>B. smithwhitei</i>	0	1	?	0	1	2	1	0	0	0	0	0
<i>B. watanabei</i>	0	1	0	0	?	?	1	0	0	?	?	?
<i>Brachyscome muelleri</i> group												
<i>B. muelleri</i>	0	0	1	0	0	1	0	0	0	0	0	0
<i>B. muelleroides</i>	0	1	1	0	1	2	1	0	0	0	0	0
<i>B. ptychocarpa</i>	0	1	1	0	0	0	1	0	0	0	0	0

Taxon/Character	61	62	63	64	65	66	67	68	69	70	71	72
<i>Brachyscome multifida</i> group												
<i>B. abercrombiensis</i>	1	0	1	0	?	?	1	0	0	?	?	?
<i>B. dissectifolia</i>	0	1	1	0	0	1	1	0	0	0	0	0
<i>B. melanocarpa</i>	0	0	1	0	0	1	1	0	0	0	0	0
<i>B. microcarpa</i> complex	0	0	1	0	0	1	1	0	0	0	0	0
<i>B. multifida</i> s.str.	0	0	1	0	0	?	1	0	0	0	0	1
<i>B. multifida</i> (Grampians)	0	0	1	0	0	1	1	0	0	1	0	0
<i>B. nova-anglica</i>	0	0	1	0	?	?	1	0	0	0	0	1
<i>B. stuartii</i>	0	1	1	0	0	1	1	0	0	0	0	0
<i>B. tamworthensis</i>	0	0	1	0	?	?	1	0	0	0	0	0
<i>B. trisecta</i>	0	0	1	0	?	?	1	0	0	?	?	?
<i>Brachyscome nivalis</i> group												
<i>B. barkerae</i>	0	0	1	0	?	?	1	0	0	?	?	?
<i>B. nivalis</i>	1	0	1	0	1	?	1	0	0	0	0	0
<i>B. radicans</i>	1	1	1	0	0	2	1	0	0	0	0	0
<i>B. stolonifera</i>	0	0	1	0	0	0	1	0	0	0	0	0
<i>B. tadgellii</i>	0	0	1	0	0	0	1	0	0	0	0	0
<i>B. walshii</i>	1	0	1	0	?	?	1	0	0	?	?	?
<i>Paquerina</i> group												
<i>B. elegans</i>	0	0	?	0	?	?	0	0	0	?	?	?
<i>B. foliosa</i>	0	0	1	0	0	1	1	0	0	0	0	?
<i>B. graminea</i>	0	0	1	0	0	1	1	0	0	1	0	0
<i>B. humilis</i>	1	0	1	0	?	?	1	0	0	1	0	0
<i>B. linearis</i>	0	0	1	0	1	1	1	1	0	1	0	0
<i>B. longiscapa</i>	0	0	1	0	0	1	0	0	0	1	0	0
<i>B. montana</i>	0	0	1	0	?	?	1	0	0	1	0	0
<i>B. obovata</i>	0	0	1	0	0	2	1	0	0	1	0	0
<i>B. papuana</i>	0	0	1	0	?	?	0	0	0	?	?	?
<i>B. pinnata</i>	0	0	1	0	0	?	?	0	0	1	0	0
<i>B. radicata</i>	0	0	1	0	0	1	1	0	0	1	0	0
<i>B. scapigena</i>	0	0	1	0	0	1	1	0	0	1	0	0
<i>B. sinclairii</i>	0	0	1	0	0	1	?	0	0	1	0	0
<i>B. staceae</i>	0	0	1	0	?	?	?	0	0	1	0	0
<i>B. tasmanica</i>	0	0	1	0	?	?	1	0	0	?	?	?
<i>B. tenuiscapa</i>	0	0	1	0	?	?	1	0	0	?	?	?
<i>Brachyscome triloba</i> group												
<i>B. brownii</i>	1	0	1	0	?	?	1	0	0	0	0	?
<i>B. formosa</i>	1	1	1	0	0	1	1	0	0	1	0	0
<i>B. kaputarensis</i>	1	0	1	0	0	1	1	0	0	0	0	0
<i>B. mittagongensis</i>	1	0	1	0	?	?	1	0	0	1	0	0
<i>B. petrophila</i>	0	0	1	0	0	1	1	0	0	1	0	0
<i>B. procumbens</i>	1	0	1	0	?	?	1	0	0	1	0	0
<i>B. salkiniae</i>	1	0	1	0	0	1	1	0	0	?	?	?
<i>B. sieberi</i>	2	0	1	0	0	1	1	0	0	0	0	0
<i>B. triloba</i>	1,2	0	1	0	?	?	1	0	0	1	0	0
<i>B. willisii</i>	1	0	1	0	?	?	1	0	0	1	0	0
<i>Brachyscome whitei</i> group												
<i>B. whitei</i>	0	1	?	0	0	0	1	0	0	0	0	0
<i>Hullsia</i>												
<i>H. argillicola</i>	0	0	1	0	0	0	0	0	0	?	?	?
<i>Pembertonia</i>												
<i>P. latisquamata</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>Pytinicarpa</i>												
<i>P. neocaledonica</i>	0	0	0	0	?	?	0	0	0	?	?	?
<i>P. sarassini</i>	0	0	0	0	?	?	0	0	0	?	?	?
<i>Roebuckia</i>												
<i>R. cheilocarpa</i>	0	1	1	1	1	0	1	0	0	1	0	0
<i>R. chinmockii</i>	0	1	1	1	?	?	1	0	0	?	?	?
<i>R. ciliocarpa</i>	0	1	1	1	1	2	1	0	0	1	0	0
<i>R. cuneata</i>	1	0	1	1	1	?	1	0	0	?	?	?
<i>R. halophila</i>	0	1	1	1	1	2	1	0	0	1	0	0
<i>R. latbamensis</i>	0	1	1	1	?	?	1	0	0	1	0	0
<i>R. nerrenensis</i>	0	1	1	1	?	?	1	0	0	1	0	0
<i>R. oncocarpa</i>	0	1	?	1	?	?	1	0	0	1	0	0
<i>R. similis</i>	0	1	1	1	1	2	1	0	0	1	0	0

Taxon/Character	73	74	75	76	77
<b>Allittia</b>					
<i>A. cardiocarpa</i>	0	0	0	0	0
<i>A. uliginosa</i>	0	0	0	0	0
<b>Brachyscome</b>					
<i>Brachyscome aculeata</i> group					
<i>B. aculeata</i>	0	0	0	0	0
<i>B. ascendens</i>	?	?	?	?	?
<i>B. cuneifolia</i>	0	0	0	0	0
<i>B. riparia</i>	0	0	0	0	0
<i>B. spatulata</i>	0	0	0	0	0
<i>Brachyscome basaltica</i> group					
<i>B. basaltica</i>	0	0	0	0	0
<i>B. paludicola</i>	1	0	0	0	0
<i>B. rara</i>	1	0	0	0	0
<i>Brachystephium</i> group					
<i>B. castiana</i>	?	?	?	?	?
<i>B. diversifolia</i>	0	0	1	0	0
<i>B. goniocarpa</i>	0	0	1	0	0
<i>B. gracilis</i>	0	0	1	0	0
<i>B. nodosa</i>	0	0	0	1	0
<i>B. readeri</i>	0	1	0	0	0
<i>B. segmentosa</i>	?	?	?	?	?
<i>Brachyscome ciliaris</i> group					
<i>B. blackii</i>	?	?	?	?	?
<i>B. ciliaris</i> complex	0	0	0	0	0
<i>B. dalbyensis</i>	0	0	0	0	0
<i>B. glandulosa</i>	0	0	0	0	0
<i>B. parvula</i> complex	0	0	0	0	0
<i>B. perpusilla</i>	0	0	0	0	0
<i>B. rigidula</i>	0	0	0	0	0
<i>B. rudallensis</i>	?	?	?	?	?
<i>B. tatei</i>	0	0	0	0	0
<i>B. tesquorum</i>	0	0	0	0	0
<i>B. trachycarpa</i>	0	0	0	0	0
<i>B. xanthocarpa</i>	0	0	0	0	0
<i>Brachyscome decipiens</i> group					
<i>B. decipiens</i>	0	0	0	0	0
<i>Brachyscome dentata</i> group					
<i>B. chrysoglossa</i>	0	0	1	0	0
<i>B. curvicarpa</i>	0	0	1	0	0
<i>B. debilis</i>	0	0	0	1	0
<i>B. dentata</i>	0	0	1	0	0
<i>B. georginensis</i>	?	?	?	?	?
<i>B. papillosa</i>	0	0	1	0	0
<i>B. tetrapterocarpa</i>	0	0	1	0	0
<i>Brachyscome iberidifolia</i> group					
<i>B. bellidioides</i>	0	0	0	0	0
<i>B. billabongensis</i>	0	0	0	0	0
<i>B. exilis</i>	0	0	0	0	0
<i>B. eyrensis</i>	?	?	?	?	?
<i>B. gilesii</i>	0	0	0	0	0
<i>B. iberidifolia</i> complex	0	0	0	0	0
<i>B. pusilla</i>	0	0	0	0	0
<i>B. simulans</i>	?	0	?	?	?
<i>Brachyscome lineariloba</i> group					
<i>B. breviscapis</i>	0	0	1	0	0
<i>B. campylocarpa</i>	0	1	0	0	0
<i>B. dichromasomatica</i>	0	0	0	0	1
<i>B. erigona</i>	0	0	1	0	0
<i>B. lineariloba</i> 'B'	1	0	0	0	0
<i>B. lineariloba</i> 'C'	0	0	0	0	0
<i>B. smithwhitei</i>	0	0	0	1	0
<i>B. watanabei</i>	?	?	?	?	?
<i>Brachyscome muelleri</i> group					
<i>B. muelleri</i>	0	0	0	1	0
<i>B. muelleroides</i>	0	0	0	1	0
<i>B. ptychocarpa</i>	1	0	0	0	0

Taxon/Character	73	74	75	76	77
<i>Brachyscome multifida</i> group					
<i>B. abercrombiensis</i>	?	?	?	?	?
<i>B. dissectifolia</i>	1	0	0	0	0
<i>B. melanocarpa</i>	1	0	0	0	0
<i>B. microcarpa</i> complex	1	1	0	0	0
<i>B. multifida</i> s.str.	0	0	0	0	0
<i>B. multifida</i> (Grampians)	0	0	0	0	0
<i>B. nova-anglica</i>	0	0	0	0	0
<i>B. stuartii</i>	1	0	0	0	0
<i>B. tamworthensis</i>	1	0	0	0	0
<i>B. trisecta</i>	?	?	?	?	?
<i>Brachyscome nivalis</i> group					
<i>B. barkerae</i>	?	?	?	?	?
<i>B. nivalis</i>	0	0	0	0	0
<i>B. radicans</i>	0	0	0	0	0
<i>B. stolonifera</i>	0	0	0	0	0
<i>B. tadgellii</i>	0	0	0	0	0
<i>B. walshii</i>	?	?	?	?	?
<i>Paquerina</i> group					
<i>B. elegans</i>	?	?	?	?	?
<i>B. foliosa</i>	0	0	0	0	0
<i>B. graminea</i>	0	0	0	0	0
<i>B. humilis</i>	0	0	0	0	0
<i>B. linearis</i>	0	0	0	0	0
<i>B. longiscapa</i>	0	0	0	0	0
<i>B. montana</i>	0	0	0	0	0
<i>B. obovata</i>	0	0	0	0	0
<i>B. papuana</i>	?	?	?	?	?
<i>B. pinnata</i>	0	0	0	0	0
<i>B. radicata</i>	0	0	0	0	0
<i>B. scapigena</i>	0	0	0	0	0
<i>B. sinclairii</i>	0	0	0	0	0
<i>B. staccae</i>	0	0	0	0	0
<i>B. tasmanica</i>	?	?	?	?	?
<i>B. tenuiscapa</i>	?	?	?	?	?
<i>Brachyscome triloba</i> group					
<i>B. brownii</i>	0	?	?	?	?
<i>B. formosa</i>	0	0	0	0	0
<i>B. kaputarensis</i>	0	1	0	0	0
<i>B. mittagongensis</i>	0	0	0	0	0
<i>B. petrophila</i>	0	0	0	0	0
<i>B. procumbens</i>	0	0	0	0	0
<i>B. salkiniae</i>	?	?	?	?	?
<i>B. sieberi</i>	0	1	0	0	0
<i>B. triloba</i>	0	0	0	0	0
<i>B. willisii</i>	0	0	0	0	0
<i>Brachyscome whitei</i> group					
<i>B. whitei</i>	0	1	0	0	0
<b>Hullsia</b>					
<i>H. argillicola</i>	?	?	?	?	?
<b>Pembertonia</b>					
<i>P. latisquamea</i>	0	0	0	0	0
<b>Pytinicarpa</b>					
<i>P. neocaledonica</i>	?	?	?	?	?
<i>P. sarassini</i>	?	?	?	?	?
<b>Roebuckia</b>					
<i>R. cheilocarpa</i>	0	0	0	0	0
<i>R. chinmockii</i>	?	?	?	?	?
<i>R. ciliocarpa</i>	0	0	0	0	0
<i>R. cuneata</i>	?	?	?	?	?
<i>R. halophila</i>	0	0	0	0	0
<i>R. lathamensis</i>	0	0	0	0	0
<i>R. nerrenensis</i>	0	0	0	0	0
<i>R. oncocarpa</i>	0	0	0	0	0
<i>R. similis</i>	0	0	0	0	0



**Appendix 3.** Duration, capitulum sex, pollen grain number and pollen:ovule ratios in species of *Allittia*, *Brachyscome* s.lat., *Hullsia*, *Pembertonia* and *Roebuckia*.

Taxon	Duration and habit *	Capitulum sex arrangement ** (number of anthers if fewer than 5)	Microsporangium length (mm) ***	Pollen per floret ***	Pollen:ovule ratio ***	Reference, comments or voucher for pollen:ovule ratios; State in which collected.
<b><i>Allittia</i></b>						
<i>A. cardiocarpa</i>	ph	radiate (f,b)	1.1–1.5 $\bar{x}$ = 1.342 s.d. = 0.155 s.e. = 0.0694 n = 5	3,751–4,597 $\bar{x}$ = 4,286 s.d. = 345 s.e. = 154 n = 5	2,876–3,380 $\bar{x}$ = 3,175 s.d. = 187 s.e. = 83 n = 5	Short (2004), from <i>P.S. Short</i> 3238 (MEL); Vic.
<i>A. uliginosa</i>	ph	radiate (f,b)	0.83–1.02 $\bar{x}$ = 0.923 s.d. = 0.0609 s.e. = 0.0157 n = 15	2,028–3,578 $\bar{x}$ = 2,796 s.d. = 376 s.e. = 97 n = 15	1,127–2,106 $\bar{x}$ = 1,586 s.d. = 263 s.e. = 68 n = 15	Short (2004), from <i>P.S. Short</i> 3237 (MEL); Vic.
<b><i>Brachyscome</i></b>						
<i>B. abercombiensis</i>	ph	radiate (f,b)	0.74	2,308	1,663	<i>E.F. Constable</i> (NSW55990); N.S.W.
<i>B. aculeata</i>	ph	radiate (f,b)	1.15	4,671	3,571	<i>P.S. Short</i> 3996 (MEL); N.S.W.
<i>B. barkenae</i>	ph	radiate (f,b)	1.27	3,504	2,623	<i>P.S. Short</i> 3998 (MEL); N.S.W.
<i>B. basaltica</i>	ph	radiate (f,b)	0.9	3,846	3,104	<i>A.N. Rodd</i> 3219 (NSW); Qld.
<i>B. billabongensis</i>	a	radiate (f,b)	0.7	2,620	1,921	<i>P.S. Short</i> 4100 (MEL); W.A.
<i>B. breviscapis</i>	a	radiate (f,b) (4 or 5 anthers)	0.32–0.46 $\bar{x}$ = 0.395 s.d. = 0.0369 s.e. = 0.0102 n = 13	230–548 $\bar{x}$ = 428 s.d. = 105 s.e. = 29 n = 13	123–381 $\bar{x}$ = 242 s.d. = 78 s.e. = 22 n = 13	<i>P.S. Short</i> 3742 (MEL); S.A.
<i>B. campylocarpa</i>	a	radiate (f,b)	1.03	4,420	3,941	<i>N.S. Donner</i> 3631 (AD); S.A.
<i>B. cassiana</i>	a	radiate (f,b)	0.94	4,210	3,785	<i>C.W.E. Moore</i> 8859 (CANB); N.S.W.
<i>B. chrysoglossa</i>	a	radiate (f,b)	0.76–1.2 $\bar{x}$ = 0.996 s.d. = 0.119 s.e. = 0.0299 n = 16	688–5,336 $\bar{x}$ = 2,692 s.d. = 1,133 s.e. = 283 n = 16	509–3,723 $\bar{x}$ = 1,848 s.d. = 799 s.e. = 200 n = 16	Combined data from <i>P.S. Short</i> 3155 & 3587 (MEL); both Qld.
<i>B. cuneifolia</i>	ph	radiate (f,b)	0.95	4,002	2,848	<i>P.S. Short</i> 3909 (MEL); S.A.
<i>B. curvicarpa</i>	a	radiate (f,b)	0.79–1.14 $\bar{x}$ = 0.964 s.d. = 0.0942 s.e. = 0.0243 n = 15	2,510–4,571 $\bar{x}$ = 3,508 s.d. = 467 s.e. = 121 n = 15	1,812–3,420 $\bar{x}$ = 2,512 s.d. = 394 s.e. = 102 n = 15	<i>P.S. Short</i> 3554 (MEL); N.S.W.
<i>B. debilis</i>	a	radiate (f,b)	0.58 & 1.0	2,010 & 3,352	1,116 & 2,820	<i>P.S. Short</i> 3916 (MEL); Vic. See notes under species' account.
<i>B. dentata</i>	a	radiate (f,b)			805–3,669	<i>P.S. Short</i> 3626 (MEL); See species' account for more details; some specimens exhibited high pollen sterility.
<i>B. dichromosomatica</i> var. <i>dichromosomatica</i>	a	radiate (f,b)	0.72–1.28 $\bar{x}$ = 0.95 s.d. = 0.161 s.e. = 0.0425 n = 11	4,176–8,586 $\bar{x}$ = 6,640 s.d. = 1,585 s.e. = 478 n = 11	3,184–7,547 $\bar{x}$ = 5,546 s.d. = 1,422 s.e. = 429 n = 11	<i>Watanabe et al.</i> (1991), from <i>P.S. Short</i> 3761 (MEL); S.A.
<i>B. dichromosomatica</i> var. <i>alba</i>	a	radiate (f,b)	0.65–1.0 $\bar{x}$ = 0.8862 s.d. = 0.0779 s.e. = 0.0169 n = 21	4,186–5,298 $\bar{x}$ = 4,689 s.d. = 397 s.e. = 178 n = 5	3,555–4,490 $\bar{x}$ = 4,010 s.d. = 343 s.e. = 153 n = 5	<i>P.S. Short</i> 3637 (MEL); N.S.W.
<i>B. dissectifolia</i>		radiate (f,b)	1.1	2,773	1,655	<i>P.S. Short</i> 3973 (MEL)
<i>B. diversifolia</i>		radiate (f,b)	1.05–1.2 $\bar{x}$ = 1.174 s.d. = 0.910 s.e. = 0.407 n = 5	3,234–5,907 $\bar{x}$ = 4,566 s.d. = 983 s.e. = 440 n = 5	2,925–5,194 $\bar{x}$ = 4,037 s.d. = 859 s.e. = 384 n = 5	<i>P.S. Short</i> 4152 (MEL); Vic.
<i>B. eriogona</i>	a	radiate (f,b)	1.04–1.14 $\bar{x}$ = 1.0940 s.d. = 0.0397 s.e. = 0.0177 n = 5	3,103–4,648 $\bar{x}$ = 3,762 s.d. = 576 s.e. = 258 n = 5	2,764–4,272 $\bar{x}$ = 3,322 s.d. = 575 s.e. = 257 n = 5	<i>P.S. Short</i> 3121 (MEL); S.A.

Taxon	Duration and habit *	Capitulum sex arrangement ** (number of anthers if fewer than 5)	Microsporangium length (mm) ***	Pollen per floret ***	Pollen:ovule ratio ***	Reference, comments or voucher for pollen:ovule ratios; State in which collected.
<i>B. exilis</i>	a	radiate (f,b)	0.65–0.82 $\bar{x}$ = 0.750 s.d. = 0.0678 s.e. = 0.0303 n = 5	3,223–4,353 $\bar{x}$ = 3,773 s.d. = 440 s.e. = 197 n = 5	1,381–2,411 $\bar{x}$ = 2,074 s.d. = 427 s.e. = 191 n = 5	<i>P.S. Short 3908</i> (MEL); S.A.
<i>B. eyrensis</i>	a	radiate (f,b)	0.4–0.51 $\bar{x}$ = 0.452 s.d. = 0.444 s.e. = 0.198 n = 5	546–930 $\bar{x}$ = 736 s.d. = 156 s.e. = 70 n = 5	197–353 $\bar{x}$ = 265 s.d. = 70 s.e. = 31 n = 5	<i>P.S. Short 3901</i> (MEL); W.A.
<i>B. formosa</i>	ph	radiate (f,b)	0.8–1.2 $\bar{x}$ = 1.016 s.d. = 0.0994 s.e. = 0.0256 n = 15	2,910–5,250 $\bar{x}$ = 3,840 s.d. = 657 s.e. = 170 n = 15	2,018–3,733 $\bar{x}$ = 2,656 s.d. = 532 s.e. = 137 n = 15	Short (1988), from <i>P.S. Short 2425</i> (MEL); N.S.W.
<i>B. georginensis</i>	a	radiate (f,b)	1.26	6,058	not determined	<i>R. Purdie 1427</i> (BRI); Qld.
<i>B. gilesii</i>	a	radiate (f,b)	0.73–0.98 $\bar{x}$ = 0.837 s.d. = 0.0973 s.e. = 0.0397 n = 6	1,321–3,844 $\bar{x}$ = 3,202 s.d. = 650 s.e. = 265 n = 15	1,134–3,394 $\bar{x}$ = 2,846 s.d. = 601 s.e. = 245 n = 15	<i>P.S. Short 3682</i> (MEL); S.A. Estimated 4–52% pollen sterility in florets, values here relate to apparent fertile pollen.
<i>B. glandulosa</i>	a	radiate (f,b)	0.62	424	226	<i>R. Ornduff 9299-9A</i> (PERTH); W.A.
<i>B. gonicarpa</i>	a	radiate (f,b)	0.34–0.43 $\bar{x}$ = 0.397 s.d. = 0.0333 s.e. = 0.00859 n = 15	232–368 $\bar{x}$ = 321 s.d. = 36 s.e. = 9 n = 15	160–256 $\bar{x}$ = 218 s.d. = 24 s.e. = 6 n = 15	Watanabe <i>et al.</i> (1991), from <i>P.S. Short 3743</i> (MEL); S.A.
<i>B. gracilis</i>	a	radiate (f,b)	0.53–0.72 $\bar{x}$ = 0.646 s.d. = 0.0763 s.e. = 0.0341 n = 5	1,572–2,852 $\bar{x}$ = 2,348 s.d. = 561 s.e. = 251 n = 5	990–2,164 $\bar{x}$ = 1,714 s.d. = 489 s.e. = 218 n = 5	<i>P.S. Short 3364</i> (MEL); Vic.
<i>B. graminea</i>	ph	radiate (f,b)	0.87	3,444	2,234	<i>P.S. Short 4015</i> (MEL); N.S.W.
<i>B. kaputarensis</i>	ph	radiate (f,b)	1.07–1.11 $\bar{x}$ = 1.124 s.d. = 0.0666 s.e. = 0.0297 n = 5	3,430–4,942 $\bar{x}$ = 3,904 s.d. = 599 s.e. = 268 n = 5	2,310–3,145 $\bar{x}$ = 2,515 s.d. = 355 s.e. = 159 n = 5	Short (2009), from <i>P.S. Short 3944</i> (MEL); N.S.W.
<i>B. lineariloba</i> “B”	a	radiate (f,b) (4 or 5 anthers)	0.32–0.52 $\bar{x}$ = 0.432 s.d. = 0.0547 s.e. = 0.00998 n = 30	242–711 $\bar{x}$ = 508 s.d. = 123 s.e. = 22 n = 30	145–499 $\bar{x}$ = 347 s.d. = 91 s.e. = 17 n = 30	Combined data from <i>P.S. Short 3710, 3725, 3729 &amp; 3766</i> (MEL); all S.A. Haploid chromosome number of $n = 6$ recorded for all of above populations.
<i>B. lineariloba</i> “C”	a	radiate (f,b) (4 or 5 anthers)	0.32–0.67 $\bar{x}$ = 0.455 s.d. = 0.0765 s.e. = 0.0124 n = 38	232–938 $\bar{x}$ = 466 s.d. = 156 s.e. = 25 n = 38	128–613 $\bar{x}$ = 296 s.d. = 115 s.e. = 19 n = 38	Combined data from <i>P.S. Short 3625, 3647, 3653 &amp; 3661</i> (MEL); S.A. & N.S.W. Haploid chromosome number of $n = 8$ recorded for all of above populations.
<i>B. lineariloba</i> “E”	a	radiate (f,b) (4 or 5 anthers)	0.31–0.47 $\bar{x}$ = 0.387 s.d. = 0.0425 s.e. = 0.00776 n = 30	136–545 $\bar{x}$ = 236 s.d. = 91 s.e. = 17 n = 30	72–347 $\bar{x}$ = 146 s.d. = 57 s.e. = 10 n = 30	Combined data from <i>P.S. Short 3737 &amp; 3744</i> (MEL); both S.A.
<i>B. linearis</i>	?	radiate (f,b) (3 anthers)	0.44	293	98	<i>L.B. Moore</i> (CHR 233898); N.Z.
<i>B. melanocarpa</i>	a	radiate (f,b)	0.95–1.42 $\bar{x}$ = 1.178 s.d. = 0.155 s.e. = 0.0401 n = 15	3,886–8,052 $\bar{x}$ = 5,661 s.d. = 1212 s.e. = 313 n = 15	3,190–6,365 $\bar{x}$ = 4,509 s.d. = 953 s.e. = 246 n = 15	<i>P.S. Short 3578</i> (MEL); Qld.
<i>B. microcarpa</i> subsp. <i>darlingensis</i>	ph	radiate (f,b)	1.0	3,886	2,473	<i>L. Pedley 976</i> (BRI); Qld.
<i>B. microcarpa</i> subsp. <i>microcarpa</i>	ph	radiate (f,b)	0.72–0.85 $\bar{x}$ = 0.796 s.d. = 0.0532 s.e. = 0.0238 n = 5	2,098–3,302 $\bar{x}$ = 2,940 s.d. = 492 s.e. = 220 n = 5	1,661–1,764 $\bar{x}$ = 1,526 s.d. = 278 s.e. = 124 n = 5	<i>P.S. Short 3969</i> (MEL); Qld.

Taxon	Duration and habit *	Capitulum sex arrangement ** (number of anthers if fewer than 5)	Microsporangium length (mm) ***	Pollen per floret ***	Pollen:ovule ratio ***	Reference, comments or voucher for pollen:ovule ratios; State in which collected.
<i>B. mittagongensis</i>	ph	radiate (f,b)	0.99	3,372	2,458	<i>S. Smith-White 3856</i> (SYD); N.S.W.
<i>B. muelleri</i>	a	radiate (f,b)	0.62–0.94 $\bar{x}$ = 0.789 s.d. = 0.0841 s.e. = 0.0217 n = 15	2,964–4,535 $\bar{x}$ = 3,940 s.d. = 418 s.e. = 108 n = 15	1,368–2,623 $\bar{x}$ = 1,978 s.d. = 283 s.e. = 73 n = 15	<i>P.S. Short 3713</i> (MEL); S.A.
<i>B. muelleroides</i>	a	radiate (f,b)	0.52	3,047	1,500	<i>T.B. Muir 4701</i> (MEL); Vic.
<i>B. multifida</i> s.lat.	ph	radiate (f,b)	0.92–1.11 $\bar{x}$ = 0.992 s.d. = 0.763 s.e. = 0.341 n = 5	3,422–4,312 $\bar{x}$ = 3,904 s.d. = 374 s.e. = 167 n = 5	2,112–2,511 $\bar{x}$ = 2,295 s.d. = 143 s.e. = 64 n = 5	<i>P.S. Short 3942</i> (MEL); N.S.W.
<i>B. nivalis</i>	ph	radiate (f,b)	1.1	3,320	2,543	<i>P.S. Short 4005</i> (MEL); N.S.W.
<i>B. nodosa</i>	a	radiate (f,b)	0.68–0.93 $\bar{x}$ = 0.830 s.d. = 0.0783 s.e. = 0.0202 n = 9	1,528–4,522 $\bar{x}$ = 3,445 s.d. = 972 s.e. = 324 n = 9	1,331–3,738 $\bar{x}$ = 2,852 s.d. = 828 s.e. = 276 n = 9	Short & Watanabe (1993), combined data from <i>K. Watanabe 20 &amp; 24</i> (MEL); both Qld.
<i>B. nova-anglica</i>	ph	radiate (f,b)	0.96–1.2 $\bar{x}$ = 1.05 s.d. = 0.091 s.e. = 0.041 n = 5	3,831–5,432 $\bar{x}$ = 4,614 s.d. = 606 s.e. = 271 n = 5	2,454–3,765 $\bar{x}$ = 3,077 s.d. = 527 s.e. = 236 n = 5	<i>P.S. Short 3978</i> (MEL); N.S.W.
<i>B. paludicola</i>	ph	radiate (f,b)	0.88	3,202	2,214	<i>P.S. Short 3922</i> (MEL); Vic.
<i>B. papillosa</i>	a	radiate (f,b)	0.97	4,450	3,394	<i>K. Watanabe 215</i> (MEL); N.S.W.
<i>B. parvula</i>	ph	radiate (f,b)	1.0	5,094	2,513	<i>A. Moscal 3181</i> (HO); Tas.
<i>B. perpusilla</i>	a	radiate (f,b)	0.21–0.34 $\bar{x}$ = 0.274 s.d. = 0.0270 s.e. = 0.0050 n = 30	99–321 $\bar{x}$ = 203 s.d. = 52 s.e. = 10 n = 30	40–149 $\bar{x}$ = 102 s.d. = 27 s.e. = 5 n = 30	Combined data from <i>P.S. Short 3715 &amp; 3776</i> (MEL); S.A. & Vic.
<i>B. petrophila</i>	ph	radiate (f,b)	1.07	4,172	2,942	<i>N.G. Walsh 1622</i> (MEL); Vic.
<i>B. procumbens</i>	ph	radiate (f,b)	0.98	3,632	2,442	<i>P.S. Short 3951</i> (MEL); N.S.W.
<i>B. psychocarpa</i>	a	radiate (f,b)	0.62–0.74 $\bar{x}$ = 0.672 s.d. = 0.0482 s.e. = 0.0215 n = 5	2,153–3,047 $\bar{x}$ = 2,517 s.d. = 325 s.e. = 145 n = 5	1,605–2,354 $\bar{x}$ = 1,872 s.d. = 282 s.e. = 126 n = 5	<i>P.S. Short 4151</i> (MEL); Vic.
<i>B. radicans</i>	ph	radiate (f,b)	0.91	4,548	2,802	<i>P.S. Short 3976</i> (MEL); N.S.W.
<i>B. rara</i>	a	radiate (f,b)	1.07	4,546	3,530	<i>J. Reid 1142</i> (AD); S.A.
<i>B. readeri</i>	a	radiate (f,b)	0.62–0.86 $\bar{x}$ = 0.71 s.d. = 0.0995 s.e. = 0.0890 n = 5	2,335–2,919 $\bar{x}$ = 2,590 s.d. = 261 s.e. = 117 n = 5	1,274–2,145 $\bar{x}$ = 1,743 s.d. = 327 s.e. = 146 n = 5	<i>P.S. Short 3917</i> (MEL); Vic.
<i>B. salkiniae</i>	ph	radiate (f,b)	0.94	4,218	2,845	<i>N.G. Walsh 1214</i> (MEL); Vic.
<i>B. scapigera</i>	ph	radiate (f,b)	0.95–1.49 $\bar{x}$ = 1.147 s.d. = 0.129 s.e. = 0.0335 n = 15	2,988–5,915 $\bar{x}$ = 4,945 s.d. = 786 s.e. = 203 n = 15	1,718–3,282 $\bar{x}$ = 2,804 s.d. = 434 s.e. = 112 n = 15	<i>P.S. Short 3115</i> (MEL); Vic.
<i>B. sieberi</i>	ph	radiate (f,b)	0.79–1.1 $\bar{x}$ = 0.950 s.d. = 0.119 s.e. = 0.0532 n = 5	2,592–3,750 $\bar{x}$ = 3,145 s.d. = 508 s.e. = 227 n = 5	1,742–2,426 $\bar{x}$ = 2,066 s.d. = 312 s.e. = 140 n = 5	<i>P.S. Short 3979</i> (MEL); N.S.W.
<i>B. simulans</i>	a	radiate (f,b)	0.92	5,500	4,825	<i>P.S. Short 4233</i> (MEL); W.A.
<i>B. smithwhitiei</i>	a	radiate (f,b)	0.8–1.28 $\bar{x}$ = 1.090 s.d. = 0.123 s.e. = 0.032 n = 15	3,182–8,525 $\bar{x}$ = 5,204 s.d. = 1,483 s.e. = 383 n = 15	2,963–7,990 $\bar{x}$ = 4,804 s.d. = 1,390 s.e. = 359 n = 15	Short & Watanabe (1993), from <i>P.S. Short 3566</i> (MEL); Qld.
<i>B. spathulata</i>	ph	radiate (f,b)	1.13	4,360	2,992	<i>P.S. Short 3977</i> (MEL); N.S.W.

Taxon	Duration and habit *	Capitulum sex arrangement ** (number of anthers if fewer than 5)	Microsporangium length (mm) ***	Pollen per floret ***	Pollen:ovule ratio ***	Reference, comments or voucher for pollen:ovule ratios; State in which collected.
<i>B. tamworthensis</i>	ph	radiate (f,b)	1.0–1.16	4,652–5,236	2,247–2,523	<i>P.S. Short</i> 3959 (MEL); N.S.W. High pollen sterility in some plants, data from 3 plants with apparently fully fertile pollen presented here.
<i>B. tatei</i>	ph	radiate (f,b)	1.11–1.21 $\bar{x}$ = 1.180 s.d. = 0.041 s.e. = 0.018 n = 5	5,580–8,055 $\bar{x}$ = 6,903 s.d. = 930 s.e. = 416 n = 5	3,377–5,171 $\bar{x}$ = 4,354 s.d. = 644 s.e. = 416 n = 5	<i>P.S. Short</i> 3787 (MEL); S.A.
<i>B. tetrapterocarpa</i>	a	radiate (f,b)	0.87–1.3 $\bar{x}$ = 1.076 s.d. = 0.136 s.e. = 0.0305 n = 20	2,880–8,011 $\bar{x}$ = 4,648 s.d. = 1,347 s.e. = 301 n = 20	1,920–6,384 $\bar{x}$ = 3,707 s.d. = 1,156 s.e. = 259 n = 20	Combined data from <i>P.S. Short</i> 3609 & 3611 (MEL); Qld.
<i>B. triloba</i>	ph	radiate (f,b)	0.93	2,830	1,886	Short (2009), as <i>B. linearifolia</i> DC.; from <i>O.D. Evans</i> (SYD); N.S.W.
<i>B. trisecta</i>	ph	radiate (f,b)	0.64	2,466	1,569	<i>R.G. Coveny</i> (NSW 127186); N.S.W.
<i>B. whitei</i> subsp. <i>lophoptera</i>	a	radiate (f,b)	0.63–0.99 $\bar{x}$ = 0.810 s.d. = 0.0920 s.e. = 0.0171 n = 29	2,149–5,698 $\bar{x}$ = 3,886 s.d. = 794 s.e. = 147 n = 29	1,525–3,763 $\bar{x}$ = 2,669 s.d. = 633 s.e. = 118 n = 29	Combined data from <i>P.S. Short</i> 3159, 3167, 3561 & 3581 (all MEL); Qld & N.S.W.
<i>B. whitei</i> subsp. <i>whitei</i>	a	radiate (f,b)	0.85	4,704	3,011	<i>A.R. Bean</i> 9934 (MEL); Qld.
<i>B. willisii</i>	ph	radiate (f,b)	1.0	3,904	2,626	<i>J.H. Willis</i> (CANB 467949); Vic.
<i>B. xanthocarpa</i>	a	radiate (f,b)	0.58–0.83 $\bar{x}$ = 0.7 s.d. = 0.12 s.e. = 0.052 n = 5	1,582–3,310 $\bar{x}$ = 2,441 s.d. = 755 s.e. = 338 n = 5	970–2,174 $\bar{x}$ = 1,482 s.d. = 487 s.e. = 218 n = 5	<i>P.S. Short</i> 3907 (MEL); S.A.
<b>Hullsia</b>						
<i>H. argillicola</i>	ph	radiate (f,m)	1.27	5,864	5,577	Short (2004), from <i>P.K. Latz</i> 6012 (DNA); N.T.
<b>Pembertonia</b>						
<i>P. latisqueamea</i>	ps	radiate (f,b)	1.64–2.25 $\bar{x}$ = 2.02 s.d. = 0.23 s.e. = 0.103 n = 5	4,996–9,995 $\bar{x}$ = 8,406 s.d. = 2,039 s.e. = 912 n = 5	4,081–8,383 $\bar{x}$ = 7,021 s.d. = 1,782 s.e. = 797 n = 5	Short (2004), from <i>P.S. Short</i> 2470 (MEL); W.A.
<b>Roebuckia</b>						
<i>R. cheilocarpa</i> (F.Muell.) var. <i>cheilocarpa</i>	a	radiate (f,b)	0.9	4,070	3,541	<i>P.S. Short</i> 4339 (MEL); W.A.
<i>R. cheilocarpa</i> var. <i>quobbensis</i>	a	radiate (f,b)	1.0	5,063	4,506	<i>P.S. Short</i> 2062 (MEL); W.A.
<i>R. ciliocarpa</i>	a	radiate (f,b)	1.25	7,780	6,923	<i>P.S. Short</i> 3826 (MEL); W.A.
<i>R. cuneata</i>	a	radiate (f,b)	1.05	6,436	6,082	<i>P.S. Short</i> 4304B (MEL); W.A.
<i>R. halophila</i>	a	radiate (f,b)	0.78–0.98 $\bar{x}$ = 0.849 s.d. = 0.0683 s.e. = 0.0176 n = 15	2,528–5,988 $\bar{x}$ = 4,194 s.d. = 1,082 s.e. = 279 n = 15	2,043–5,283 $\bar{x}$ = 3,543 s.d. = 976 s.e. = 252 n = 15	Short (1988); from <i>B.J. Conn</i> 2160 (MEL); W.A.
<i>R. lathamensis</i> var. <i>lathamensis</i>	a	radiate (f,b)	0.9–1.05 $\bar{x}$ = 0.998 s.d. = 0.0593 s.e. = 0.0265 n = 5	3,707–6,430 $\bar{x}$ = 5,214 s.d. = 937 s.e. = 419 n = 5	3,407–5,521 $\bar{x}$ = 4,399 s.d. = 892 s.e. = 399 n = 5	<i>P.S. Short</i> 4377 (MEL); W.A.
<i>R. nerrenensis</i>	a	radiate (f,b)	1.0	4,790	4,118	<i>E.N.S. Jackson</i> 3118 (AD); W.A.
<i>R. similis</i>	a	radiate (f,b)	1.06–1.5 $\bar{x}$ = 1.275 s.d. = 0.1406 s.e. = 0.0363 n = 15	1,233–7,592 $\bar{x}$ = 5,312 s.d. = 1,776 s.e. = 459 n = 15	1,131–7,111 $\bar{x}$ = 4,712 s.d. = 1,664 s.e. = 430 n = 15	<i>P.S. Short</i> 3607 (MEL); Qld. Large range reflects possible pollen sterility from c. 1% to 82% in 11 individuals.

\* a, annual; ph, biennial or perennial herb or subshrub; ps, scandent shrub. \*\* (f,b), capitulum with female ray florets and bisexual disc florets; (f,m), capitulum with female ray florets and male disc florets. \*\*\*  $\bar{x}$ , mean; s.d., standard deviation; s.e., standard error.

# Index to Scientific Names

New names and new combinations are in **bold**. Other accepted names of Australian taxa are in **bold italic**, those from New Guinea and New Zealand are in regular font. Synonyms, misapplied, misspelt, illegitimate, invalid, excluded and names of uncertain application are in *italics*.

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## ***Roebuckiella* P.S.Short, nom. nov., a replacement name for *Roebuckia* P.S.Short (2014), with new combinations**

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Previously: National Herbarium of Victoria (MEL) & Northern Territory Herbarium (DNA)

### **Abstract**

The new name *Roebuckiella* P.S.Short (Asteraceae) is published to replace *Roebuckia* P.S.Short (2014), nom. illeg., with new combinations made for the nine constituent species and infraspecific taxa recognised.

**Keywords:** Asteraceae, *Roebuckia* nom. illeg., *Roebuckiella*, new names, replacement names.

### **Introduction**

Subsequent to publication of a review of the daisy genus *Brachyscome* s.lat. (Short 2014), in which I described the genus *Roebuckia*, it was brought to my attention that the latter name is a homonym of *Roebuckia* McLoughlin (1996, p. 29), a name applied to an Australian fossil fern. I here publish a replacement name, *Roebuckiella*, and make the appropriate new combinations to accommodate the taxa I previously placed in the illegitimate *Roebuckia* P.S.Short (2014).

Although *Roebuckia* P.S.Short is illegitimate, the names of new species and varieties I published under that name are legitimate and are basionyms for most of the new combinations made here (see Art. 55.1, *International Code of Nomenclature for Algae, Fungi and Plants*; McNeill et al. 2012).

I have chosen the new name to maintain a link to the illegitimate name which was chosen to commemorate the visit of William Dampier to Australian shores.

The names of species and infraspecific taxa are presented in the same numbered order, i.e. alphabetically, as in Short (2014). All synonyms, not just basionyms, are included.

### ***Roebuckiella* P.S.Short, nom. nov.**

*Roebuckia* P.S.Short, J. Adelaide Bot. Gard. 28: 169 (2014), nom. illeg., non *Roebuckia* McLoughlin, Rec. West. Aust. Mus. 18: 29 (1996). — **Type:** *Roebuckiella halophila* (P.S.Short) P.S.Short.

### **1. *Roebuckiella cheilocarpa* (F.Muell.) P.S.Short, comb. nov.**

*Brachyscome cheilocarpa* F.Muell., S. Sci. Rec. 2: 172 (1882) (“*Brachycome*”), basionym. — *Roebuckia cheilocarpa* (F.Muell.) P.S.Short, J. Adelaide Bot. Gard. 28: 172, Fig. 8A–C, 12E, F, 55–57 (2014).

### **1a. *Roebuckiella cheilocarpa* var. *cheilocarpa***

*Roebuckia cheilocarpa* var. *cheilocarpa*; P.S.Short, J. Adelaide Bot. Gard. 28: 175, Fig. 8A, B, 12E, F (2014).

### **1b. *Roebuckiella cheilocarpa* var. *glabrata* (P.S.Short) P.S.Short, comb. nov.**

*Roebuckia cheilocarpa* var. *glabrata* P.S.Short, J. Adelaide Bot. Gard. 28: 175, Fig. 55 (2014), basionym.

### **1c. *Roebuckiella cheilocarpa* var. *integra* (P.S.Short) P.S.Short, comb. nov.**

*Roebuckia cheilocarpa* var. *integra* P.S.Short, J. Adelaide Bot. Gard. 28: 175, Fig. 56 (2014), basionym.

### **1d. *Roebuckiella cheilocarpa* var. *quobbensis* (P.S.Short) P.S.Short, comb. nov.**

*Roebuckia cheilocarpa* var. *quobbensis* P.S.Short, J. Adelaide Bot. Gard. 28: 176, Fig. 8C, 57 (2014), basionym.

### **2. *Roebuckiella chinnockii* (P.S.Short) P.S.Short, comb. nov.**

*Roebuckia chinnockii* P.S.Short, J. Adelaide Bot. Gard. 28: 178, Fig. 8E, F, 58 (2014), basionym.

### **3. *Roebuckiella ciliocarpa* (W.Fitzg.) P.S.Short, comb. nov.**

*Brachyscome ciliocarpa* W.Fitzg., J. Western Australia Nat. Hist. Soc. 2: 23 (1905) (“*Brachycome*”), basionym. — *Roebuckia ciliocarpa* (W.Fitzg.) P.S.Short, J. Adelaide Bot. Gard. 28: 179, Fig. 8G, H, 12G, 59 (2014).

### **4. *Roebuckiella cuneata* (P.S.Short) P.S.Short, comb. nov.**

*Roebuckia cuneata* P.S.Short, J. Adelaide Bot. Gard. 28: 180, Fig. 60 (2014), basionym.

### **5. *Roebuckiella halophila* (P.S.Short) P.S.Short, comb. nov.**

*Brachyscome halophila* P.S.Short, Muelleria 6: 393, Fig. 1 & 3 (1988), basionym. — *Roebuckia halophila* (P.S.Short) P.S.Short, J. Adelaide Bot. Gard. 28: 182, Fig. 8I, J, 12H (2014).

### **6. *Roebuckiella lathamensis* (P.S.Short) P.S.Short, comb. nov.**

*Roebuckia lathamensis* P.S.Short, J. Adelaide Bot. Gard. 28: 183, Fig. 8K, L, 61–63 (2014), basionym.

**6a. *Roebuckiella lathamensis* var. *lathamensis***

*Roebuckia lathamensis* var. *lathamensis*; P.S.Short, J. Adelaide Bot. Gard. 28: 184, Fig. 61 (2014).

**6b. *Roebuckiella lathamensis* var. *glabrata* (P.S.Short) P.S.Short, comb. nov.**

*Roebuckia lathamensis* var. *glabrata* P.S.Short, J. Adelaide Bot. Gard. 28: 184, Fig. 8K, L, 62 (2014), basionym.

**6c. *Roebuckiella lathamensis* var. *glandulosa* (P.S.Short) P.S.Short, comb. nov.**

*Roebuckia lathamensis* var. *glandulosa* P.S.Short, J. Adelaide Bot. Gard. 28: 184, Fig. 63 (2014), basionym.

**7. *Roebuckiella nerrenensis* (P.S.Short) P.S.Short, comb. nov.**

*Roebuckia nerrenensis* P.S.Short, J. Adelaide Bot. Gard. 28: 186, Fig. 8O, P, 64 (2014), basionym.

**8. *Roebuckiella oncocarpa* (Diels) P.S.Short, comb. nov.**

*Brachyscome oncocarpa* Diels, Bot. Jahrb. 35: 606 (1905) ("*Brachycome*"), basionym. — *Roebuckia oncocarpa* (Diels) P.S.Short, J. Adelaide Bot. Gard. 28: 186, Fig. 8M (2014).

**9. *Roebuckiella similis* (P.S.Short) P.S.Short, comb. nov.**

*Roebuckia similis* P.S.Short, J. Adelaide Bot. Gard. 28: 188, Fig. 8N, 65 (2014), basionym.

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